



**FOREIGN
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USSR: Chemistry

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SCIENCE & TECHNOLOGY

USSR: CHEMISTRY

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UDC 533.66.063

CHARGING OF AEROSOL PARTICLES WITH DIFFERENT DIELECTRIC PERMEABILITY IN UNIPOLAR IONIC ATMOSPHERE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 3, Mar 87
(manuscript received 10 Jun 85) pp 678-683

[Article by A. V. Zagnitko and A. A. Kirsh]

[Abstract] Results are presented from measurement of the mean charge of aerosol particles of vaseline oil, transformer oil, dibutylphthalate, glycerine and sulfuric acid with particle radius 0.4-1.2 μ m. Particles were obtained by dispersion and condensation methods. The particles were charged in weakly ionized air under conditions corresponding to the diffusion and impact mechanisms of charging. It was found that traces of ionizing impurities had an influence on charging in a strong electric field even for droplets of oil with very low values of dielectric permeability. When an external electric field of 2-4 kV/cm is present, the mean charge of the particles increases with increasing dielectric permeability. Figures 4; references 14: 8 Russian, 6 Western.

6508/5915
CSO: 1841/290

UDC 536.422.4;546.831.4

DETERMINING MECHANISM OF CONDENSATION OF SUPERSATURATED VAPOR BY STUDYING CONDENSATE MORPHOLOGY

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 3, Mar 87
(manuscript received 22 Jul 85) pp 708-714

[Article by I. V. Melikhov, V. Ya. Lebedev and S. S. Berdonosov, Moscow State University imeni M. V. Lomonosov, Department of Chemistry]

[Abstract] The contributions of volumetric and surface processes to the properties of a condensate can be delimited by studying the variation in condensate morphology as a function of placement of the substrate relative to the vapor source. The authors demonstrate the possibility of determining the insignificance of volumetric and surface condensation on the example of condensation of $ZrCl_4$. Figures 3; references 12: 6 Russian, 6 Western.

6508/5915
CSO: 1841/290

UDC 547.944/945

ALKALOIDS OF PETILIMUM RADDEANA. PART 5. STRUCTURE OF PETISIDINONE

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 5, Sep-Oct 86
(manuscript received 23 Apr 86) pp 620-622

[Article by A. Nabiyeu, R. Shakirov and S. Yu. Yunusov, Order of Red Banner of Labor Institute of Chemistry of Plant Substances UzSSR Academy of Sciences, Tashkent]

[Abstract] Continuing studies of the alkaloids of the above-ground portion of *Petilium raddeana* (Regel) Vved, the known alkaloids edpetilin and edpetin were extracted from the chloroform portion, plus a new alkaloid petisidon $[\alpha]_D^{20}$ (C 0.169; chloroform) $C_{27}H_{39}NO_3$ (M^+ 425). The IR spectrum of the new compound has intensive absorption bands of carbonyl at 1710 cm^{-1} , α , β -unsaturated ketone at 1690 cm^{-1} and the C=N double bond at 1610 cm^{-1} . The PMR spectra were also measured, and the spectral data indicated that petisidon is a typical steroid alkaloid of the tomatillidine group, possibly an oxidized product of petisidine. The structure of the new alkaloid is $\Delta^{23(N)}$ -23, 26-imino-3, 6, 22-trione-cholestane. References 6: 5 Russian, 1 Western.

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CSO: 1841/151

UDC 547.944/945

HAPLAPHIN--NEW ALKALOID OF HAPLOPHYLLUM PERFORATUM

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 5, Sep-Oct 86
(manuscript received 15 Apr 86) pp 654-655

[Article by I. A. Bessonova and S. Yu. Yunusov, Order of Red Banner of Labor Institute of Plant Substance Chemistry, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] The air-dry above-ground portion of a specimen of *haplophyllum perforatum* was extracted with ethanol, a small quantity of the evaporated alcohol extract was treated with a 10% solution of sulfuric acid, revealing

that the alkaloids were not extracted by the acid solution. The extract was then boiled with ether, the thickened ether extract chromatographed on a column with silica gel. The late ether eluates contained the alkaloid haplamin. From the ether eluates, 15 mg of a substance with melting point 159-160°C (acetone), $M^{+}22^9$ (mass spectrometry) was extracted, called haplaphin. IR and PMR spectral studies indicated that haplaphin has the structure 4-γ, γ-dimethylallyloxy-2-quinolone. Mass spectral data also confirmed this structure. Reference 1 (Russian).

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CONVOLVIDIN--NATIVE ALKALOID OF CONVULVULUS SUBHIRSUTUM

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 5, Sep-Oct 86
(manuscript received 11 May 86) pp 657-658

[Article by S. F. Aripova and S. Yu. Yunusov, Order of Red Banner of Labor, Institute of Plant Substance Chemistry, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] This is a study of the total alkaloids from roots of convulvulus subhirsutum regel. 26.75 g ether and 23.0 g chloroform alkaloids were used to obtain them from 2.8 kg of roots, representing 1.78% of the weight of the roots. Treatment of the ether fraction with acetone yielded convolvine with impurity convolamine. Elution on a column with petroleum ether and ethyl ether yielded crystals with m.p. 189-190°C, R_f 0.55, soluble in acetone, chloroform, slightly soluble in alcohol and ether. Mass spectral studies, IR and NMR spectra, as well as the melting point and R_f , indicate that the substance is the alkaloid convolvidin previously obtained from convulvulus pseudo-canthabrica and described as a product of condensation of convolvine with dichloroethane formed in the process of extraction of the alkaloids from the plant by dichloroethane. Convolvidin is actually formed upon heating of convolvine with moist dichloroethane. However, extractions were performed without using dichloroethane, indicating that convolvidin is a product of the vital activity of the plant organism. References 3 (Russian).

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SYNTHESIS OF QUATERNARY AMMONIUM SALTS, DERIVATIVES OF CYTISINE (REPORT VI)

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 87
(manuscript received 28 Mar 86) pp 35-37

[Article by I. Primukhmedov and S. N. Aminov, Tashkent Pharmaceutical
Institute]

[Abstract] Continuing their studies on synthesis of cytosine derivatives, the authors produced new derivatives: N-(monoiodoacetyl)-cytosine (I), N-(acetyl-N-pyridinium iodide)-cytosine (II), N-(acetyl-N-pyridinium chloride)-cytosine (III), N-(acetyl-N-triethyl ammonium chloride)-cytosine (IV) and N-(acetyl-N-γ-picolinium chloride)-cytosine (V). All the quaternary ammonium salts produced yield the characteristic reaction to the chloride and iodide anions in silver nitrate reaction solution. The structures of the compounds produced were confirmed by IR and mass spectra. Thin layer chromatography on aluminum oxide was used to confirm the individuality of the substances. References 6 (Russian).

6508/5915

CSO: 1841/339

UDC 541.183

THEORETICAL PRINCIPLES OF SEMICONDUCTOR SENSOR METHOD IN ACTIVE GAS ANALYSIS.
PART 3. METHODS OF QUANTITATIVE DETECTIONMoscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 3, Mar 87
(manuscript received 30 Oct 85) pp 577-596[Article by V. Ya. Sukharev and I. A. Myasnikov, Scientific Research
Physical-Chemical Institute imeni L. Ya. Karpov. Moscow]

[Abstract] A study is reported of problems of quantitative relationships between adsorption and changes in electrophysical parameters of the adsorbent. The quantitative relationship between the value and kinetics of change of adsorbent conductivity during adsorption of active particles and their concentration in the surrounding environment is discussed. Some examples of the use of semiconductor sensors in physical and chemical studies are presented. Their low cost, small size and high sensitivity make these devices highly suitable for such uses. Problems of reliability and reproducibility of parameters by these devices have been partially solved by the use of thin-film and thick-film microelectronic techniques. Further development of fundamental research into the physical chemistry of surface phenomena is still needed to determine the optimal methods for creation of detectors for various gases. Figures 8; references 57: 47 Russian, 10 Western.

6508/5915
CSO: 1841/290

UDC 539.234/621.315.592.9:546.24

STUDY OF TRANSITION LAYER IN PbSnTe/PbSeTe HETEROSTRUCTURES BY
AUGER-ELECTRON SPECTROSCOPYMoscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 1, Jan 87
(manuscript received 5 Feb 86) pp 125-129[Article by O. N. Krylyuk, A. M. Gaskov, Yu. N. Simirskiy, V. P. Zlomanov and
Academician A. V. Novoselova, Moscow State University imeni M. V. Lomonosov]

[Abstract] Quantitative Auger spectroscopy is used to study the composition through the thickness of heterostructures of $\text{Pb}_{0.8}\text{Sn}_{0.2}\text{Te}/\text{PbSe}_{0.08}\text{Te}_{0.92}$ in

the area of the interface between film and substrate. The diffusion of tin is studied in single crystals of $\text{PbSe}_{0.08}\text{Te}_{0.92}$ solid solution using labeled tin-113. The diffusion conditions corresponded to the process of production of epitaxial layers of $\text{Pb}_{0.8}\text{Sn}_{0.2}\text{Te}$ on $\text{PbSe}_{0.08}\text{Te}_{0.92}$ by vacuum condensation. The distribution of tin in the transition layer of the heterostructure was analyzed. The experimental distribution of tin in the heterostructure obtained by Auger electron spectroscopy agreed well with the calculated values, allowing computation of the thickness of the transition area of the heterostructure as a function of the growth conditions, evaporation temperature, condensation temperature and growth time. Figures 3; references 12: 5 Russian, 7 Western.

6508/5915
CSO: 1841/165

UDC 539.211:548.74

AUGER-ELECTRON SPECTROSCOPY OF Cu-Si(111) INTERFACE

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: SERIYA R: FIZIKA, KHIMIYA
in Russian No 3, Aug 86 (manuscript received 15 Jan 86) pp 103-107

[Article by V. K. Adamchuk and I. V. Lyubinetskiy]

[Abstract] A study is reported of the system Cu-Si(111) by means of two mutually supplementary methods--the method of layer-by-layer formation of the interface combined with Auger electron spectroscopy and layer-by-layer analysis of the system formed through its depth in combination with Auger spectroscopy with ion beam atomization performed in situ. The Auger spectra indicate that the depth of attenuation of the Auger electron flow differs significantly for Cu and for Si as a result of formation of a new compound in the area of the interface due to strong interaction between the Cu and Si atoms; this indicates that interaction between silicon and copper begins at the very beginning of precipitation of Cu atoms onto the Si substrate. The behavior of the spectra with increasing copper thickness indicates some mixing of the contacting components with no extended layer of stoichiometric copper silicide. Beginning at a copper layer thickness of about 6 nm, a pure and continuous film of copper is formed. Figures 3; references 11 (Western).

6508/5915
CSO: 1841/166

ATOMIC-EMISSION ANALYSIS WITH INDUCTION PLASMA. PRINCIPLES OF METHOD
AND OPTIMIZATION OF MEASUREMENT CONDITIONS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 41, No 12, Dec 86
(manuscript received 11 Nov 85) pp 2117-2134

[Article by E. G. Chudinov]

[Abstract] This is a review. After decisively rejecting the term "inductively coupled plasma," the author discusses atomic-emission analysis using such a plasma, a rapidly developing and powerful analytic method. The principles of the method and physical conditions in the plasma are noted. A theoretical description of an induction plasma is presented, and suggestions are made for optimizing analysis conditions. Figures 7; references 147: 13 Russian, 134 Western.

6508/5915
CSO: 1841/188

ATOMIC ABSORPTION DETERMINATION OF BASIC COMPONENTS OF PRODUCTION WELDING
MATERIALS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 41, No 12, Dec 86
(manuscript received 16 Oct 85) pp 2160-2163

[Article by M. Yu. Burylin, Z. A. Temerdashev, A. P. Bayanov and L. V. Saprykin, Kuban State University, Krasnodar]

[Abstract] The purpose of this work was to develop a method of atomic absorption determination of the major components of materials used in production welding. Studies were performed with standard specimens of ferrosilicon, ferrosilicozirconium, iron powder, sodium silicate and quartz sand. It was shown that the most accurate and reproducible results are obtained by use of second and third power polynomials as approximating functions. References 7: 4 Russian, 3 Western.

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UDC 541.128

UNSTABLE MODES IN AUTOCATALYTIC REACTIONS WITH DIFFUSION. PART 3.
CLASSIFICATION OF SUPERCRITICAL MODES

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 3, Mar 87
(manuscript received 27 May 85) pp 842-844

[Article by V. A. Yelyukhin and L. I. Khlpanov, Institute of New Chemical Problems, USSR Academy of Sciences, Chernogolovka]

[Abstract] Classification of supercritical modes in autocatalytic reactions with diffusion is a central problem of the theory of dissipative structures. The classification problem can be solved only by studying the long-term development and interaction of excited disturbances. Analysis of the results of numerical calculations using a nonlinear parabolic equation has shown that in the supercritical area of autocatalytic reactions with diffusion, self-ordering modes are realized, leading to formation of a monochromatic wave, with low-mode quasiperiodic and multiple-mode turbulent conditions. The possibility of implementation of the modes depends on the dispersion of the medium, the variation of phase with amplitude, the area occupied by the excited wave packet and the initial conditions. In nondispersed systems with independence of disturbance phase from amplitudes, concentration disturbances evolve to a monochromatic wave. In dispersed systems with independence of dispersion phase from amplitude, a monochromatic wave is also established. Numerical solutions of the nonlinear parabolic equation show that excitation of turbulence requires a phase disturbance of finite magnitude. The mechanism of development of multimode turbulence determined from the equation is similar to the mechanism of development of turbulence in hydrodynamics suggested by Landau. Reference 6 (Russian).

6508/5915
CSO: 1841/290

MECHANISM OF EPOXIDATION OF PROPYLENE BY HYDROGEN PEROXIDE IN CATALYTIC
SYSTEM $\text{PPFe}^{3+} \cdot \text{OH} / \alpha\text{-Al}_2\text{O}_3$, MODELING CYTOCHROME P-450

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 2, KHIMIYA in Russian
Vol 28, No 1, Jan-Feb 87 (manuscript received 10 Nov 85) pp 42-45

[Article by T. M. Nagiyev, Z. M. Nagiyeva and Sh. A. Tagiyeva, Institute of
Theoretical Problems of Chemical Technology, Baku]

[Abstract] Studies were performed to determine a number of aspects of the
mechanism of action of $\text{PPFe}^{3+} \cdot \text{OH} / \alpha\text{-Al}_2\text{O}_3$, a cytochrome P-450 analog. Diagrams
are presented illustrating the suggested mechanisms of the catalytic reactions
involved, indicating that, depending on which carbon atom of the propylene
molecule the OOH interacts with, the enol form of the corresponding end
products are formed which, by keto-enol tautomerism, is easily transformed to
propionic aldehyde or acetone. Figure 1; references 5: 4 Russian, 1 Western.

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CSO: 1841/308

UDC 54-148+541.15

ENERGY ASPECTS OF WATER RADIOLYSIS ON ALKALI METAL HALIDE SURFACE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 1, Jan 87
(manuscript received 30 May 85) pp 198-201

[Article by A. B. Aleksandrov, A. L. Gusev and N. G. Petrik, Leningrad
Technologic Institute imeni Lensovet]

[Abstract] A study was conducted on the rate of gamma-radiolysis of water at
an irradiation rate of 0.6 Gy/sec at 305 ± 5 K on the surface of alkali metal
halides. The rate was found to be dependent on the nature of the salt, crystal
size, and the concentration of the adsorbate. Maximum radiochemical yields for
water decomposition on 0.2 mm crystals were 10^{-2} , 5×10^{-3} , and 10^{-4} eV^{-1} for
RbI, KI and NaI, respectively, in terms of energy absorbed by the crystal. The
maximum yield on CsI was 5×10^{-5} eV^{-1} . The difference between CsI and RbI was
attributed to differences in surface structure and the crystalline lattice-work.
The results were interpreted to indicate that the process of energy transfer to
the surface and to the adsorbed water molecules is structure-sensitive, i.e.,
interwoven with the inducement, migration and relaxation of low-energy excited
states on the crystal surface. The diffusion-based translation of thermalized
electrons and electron holes in the alkali metal halides have been shown to
exceed values conventionally accepted, with the excitation of the adsorbed
water molecules assuring an outflow from the crystal from a depth of 0.1 to
1 mm. Figures 3; references 5 (Russian).

12172/5915
CSO: 1841/320

STATE ACCEPTANCE DRAWBACKS IN INDUSTRIAL CHEMISTRY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Mar 87 p 1

[Article by F. Tatarskiy, chief of the Technical Department of the Soyuzneorganika VPO [All-Union Industrial Association], Minkhimprom [Ministry of the Chemical Industry]: "Not To Be Drowned in Paperwork"; first paragraph is source introduction]

[Text] For a long time the Khimprom Production Association in Slavyansk has been regularly included among the "unstably operating enterprises," or, to put it simply, those that have not been fulfilling the plan. We shall not discuss in detail the reason for this -- a considerable number of problems have accumulated. But since the New Year they have been augmented by yet another one: at precisely that association it was decided to introduce state acceptance of output. Chief engineer Yu. Bakhmutov in November 1986 shouted at me over the telephone, "What do you want to do, give us the coup de grace? Why do you always have to begin with us?"

Slavyansk-Moscow. And so the first steps have been taken. Assizes of the Soyuzneorganika All-Union Association's staff for dealing with questions of state acceptance was held in Slavyansk.

Outwardly the results of the work in accordance with the new method seemed to be rather good -- practically all the output had been accepted by state acceptance (ten tons of rejected soda, of course, is not included, taking into consideration the volume of production. Ninety-five percent of the output was accepted the first time it was presented. However, at the staff session we also heard other speeches.

The first thing that the plant specialists mentioned was, "How could we overlook so many absurdities in the technical-norm documentation?" It would seem that everyone had worked together assiduously to develop the documentation, had got the proper people to sign off, had coordinated it, and had approved everything -- why, they had worked for years on that documentation! And now state acceptance has arrived and it has turned out that the observance of certain requirements is sometimes simply inefficient, and sometimes even impossible.

Open up any GOST [All-Union State Standard], any specifications for chemical products that have been packaged in sacks, drums, or boxes, and you will always find a requirement of the type: "net product weight 30 kilograms, plus or minus one percent" (the figures may be different, but the meaning is the same). That means that the error in measuring the contents weight must not exceed 300 grams per sack. But how accurate are our measurement equipment and packaging machines? Let's open at random any operational specifications list for a packaging machine: either the accuracy is not indicated at all, or it is 5, 7, or 10 percent...

"How could you have missed those requirements?"

"Who would have been interested in them? The consumer was never the worse off -- we always weigh the filled railroad cars with an 'overweight', just in case. But as for how much was in one sack, no one was concerned."

State acceptance looks at it differently: if a certain requirement is stated in the standard, then it must be fulfilled! But how can it be fulfilled? Even if there were ideas about increasing the accuracy of the weighing equipment, that work would have taken not days but months. But only one idea appeared: buy weighing equipment and automatic packaging machines abroad, where the weighing accuracy is the first technical requirement made on such equipment. People felt, if the state has introduced state acceptance, then let it pay through the nose!

Or take another example -- residue in sodium tripolyphosphate. When the KazNIIgiprosfor Institute submitted for approval a GOST draft with the requirement "residue in a sieve with a side slit of 0.5 mm -- none," no one noticed that requirement. The product is better than all the known foreign counterparts, and for them the indicator of the granulometric composition is not subject to standards at all. The product was awarded the Quality Seal long ago and over a period of many years there has not been a single complaint or claim.

But in the very first batch that was submitted to the state inspectors, they required a sieve analysis, and there was indeed residue! It was only a small amount, just one-tenth of a percent, that is, a kilogram per ton, but nevertheless it was residue! "I will not accept it!" the state acceptance representative said firmly. "You'll have to get authorization from Gosstandart." And Gosstandart gave that authorization -- with a five-percent markdown on the price. For the enterprise that is a loss of 2.5 million rubles -- a financial chasm from which it is no easy matter to get out of quickly.

"But this is not being done the government way!" people say at the association. "What kind of acceptance is it? It's state acceptance! Then let's resolve the questions in such a way that it is advantageous for the state. If this markdown means that we won't have any more funds left and people will start scattering all over the place, who benefits from that?"

It's no simple matter to answer questions like that. Wherein does real governmental benefit exist? In assuring that every requirement in a standard

is fulfilled strictly? But what if, as in this instance, the requirement itself is completely invented and obviously unnecessary?

"Optimists" feel that with the passage of time, everything will settle down and things will hit a norm. "Pessimists" gloomily predict, "This state acceptance is not yet completely thought out. It has not gotten down to the fine points. And as soon as it gets deeply into the technology, plenty more 'watermelons' are going to come rolling out... They're going to stop us!"

An interesting detail is that the state acceptance representatives did not make any claims against the chemical composition of the output -- the chief indicator of the quality of the chemical commodity. But dozens of claims have been made -- against its outward appearance, packaging, labeling, weight, and that same granulometry. Those claims were against the "commodity entourage," as one person who spoke at the staff session said. In our subbranch, three enterprises have already been changed over to state acceptance of output, and exactly the same situation is observed there. How are we to understand that?

It is not difficult to understand it: the OTK [technical control department] checkers, until January of this year, did not release from the plant in any form whatsoever any output that was defective in chemical composition. But no attention was paid to the "entourage" indicators.

The organization of state acceptance itself is worrying the enterprise workers. For example, how many more papers will have to be added? At Khimprom during a one-month period as many as 15,000 were added in some places. For every batch of output it is necessary to fill out three types of documents: a notification of presentation of the batch, and record of test results on forms No. 3 and 4.

It is also a good thing that at Slavyansk the shop workers have been given the responsibility of signing all these documents. But, say, at the Khrompik Production Association in Pervouralsk, the state acceptance manager does not want to recognize any signatures other than those of the director or the chief engineer (and he is operating in precise conformity with Gosstandart instructions). Three hundred signatures every morning -- you will have to agree that that is a bit much!

Why, then, is there so much paper? Because the state acceptance managers in the outlying areas have been given the right to determine for themselves the necessary and sufficient volume of documentation.

A second serious question is that of shift operation. Chemical production operates continuously, but state acceptance operates only during the day, on a single shift. During a one-month period, as a result of this fact, the total value of the surplus output at the Khimprom warehouses has increased by 130,000 rubles, the turnover rate of the normed working capital dropped by half a 24-hour period, and there was a noticeable increase in freight car and tank car idle time. If, for example, a freight car arrived from the railroad station at 1700 hours, the output could be taken out of the shop -- there would seem to be no problem in loading it. But no! You have to wait until

morning, turn over the batch to state acceptance, wait for its decision, and only then begin to load it.

Another acute problem is providing instruments and equipment for output quality control. With the introduction of state acceptance the need for control means has more than doubled, but the territorial agencies of USSR Gosstab can satisfy scarcely one-fourth of the annual requisitions.

Everyone realizes that there will not be any miracle. No instruments or laboratory equipment will fall from the sky. But might it not make sense for the enterprises that are delivering output for export to be allowed to keep this year at least half the currency proceeds in order to purchase the necessary control equipment abroad? If we want to improve quality, we have to sacrifice something.

Chief engineer Yu. Bakhmutov finally said, "This is the way I understand state acceptance: they want to teach all of us how to carry out elementary procedures. And that is correct! It may be that order is precisely what we need, more than we need remodeling, more than we need new equipment. To make sure that 'one must not' means 'one must not,' and no one takes a 'close enough!' attitude. In a word, I vote 'Aye!' Even though I see that much has not yet been worked out, or thought out. But the main thing is that there be overall -- I repeat, overall -- benefit..."

5075

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VOLZHSK PRODUCTION ASSOCIATION OVERFULFILLS TASKS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Jan 87 p 1

[Unattributed article: "Leaning on a New Technique; Socialist Obligations of the Volzhsk Production Association Orgsintez in Honor of the 60th Anniversary of the Founding of the USSR Ministry of the Chemical Industry for Early Fulfillment of the Tasks of the 12th Five-Year Plan and Worthy Celebration of the 70th Anniversary of the October Revolution"]

[Text] The collective of the Volzhsk Production Association Orgsintez in honor of the 60th anniversary of the USSR, by meeting the specific tasks for the decisions of the 27th CPSU Congress and of the June 1986 Plenum of the party Central Committee, successfully completed fulfillment of the plan and of the socialist obligations of the first year of the 12th Five-Year Plan. The whole rise in production was provided by a rise in labor productivity. The relative share of production with the State Emblem of Quality exceeded 71 percent of the total production volume. Because of the overfulfillment of the tasks for labor productivity and a lowering of the production cost, an above-plan profit of 1.4 million rubles was obtained. Agreements on deliveries of production to consumers were completely fulfilled.

The workers of the association unanimously supporting the course of the party for the acceleration of the move of the economy of the USSR on the path of intensive development are taking upon themselves increased socialist obligations for fulfilling ahead of schedule the tasks of the 12th Five-Year Plan and worthy celebration of the 70th anniversary of the October Revolution.

The association obligations are based on the wide attraction of workers to the accomplishment of measures for the acceleration of scientific and technical progress by improving technologies, to increase the capacity for the production of chemicals for the tire and industrial rubber industry by a thousand metric tons, which will make possible an improvement in quality of 10 million tires. Because of intensified strengthening of discipline and organization in all areas of production and the adoption of advanced labor methods to increase labor productivity by a factor of 1.4 in the current Five-Year Plan and to disengage from the current production projects and redirect the new production projects of 300 men.

And struggling for further improvement in quality, for competitiveness of production on the world market, the necessary conditions are created for its agencies to give up government control. At the end of the Five-Year Plan, more than 86 percent of the production output is to be provided with the State Emblem of Quality. Production is to be manufactured at 20 million rubles in excess of the scheduled tasks.

The 1987 plan is to be completed ahead of schedule, on December 29. An additional production of 800,000 rubles is to be achieved for the 70th anniversary of the socialist October Revolution. Because of the introduction of a new technique, the use of patents, and efficient planning, an economic effect of a sum of 2.6 million rubles is to be obtained. In auxiliary production, the level of mechanization is to be brought up to 76 percent. There was an economy of 420,000 kwh of electrical energy and 2300 gigacalories of heat energy, to enable the enterprise to work 3 days on economized fuel-energy resources.

The implementation of the program of socialist development of the collective is to involve overfulfillment of the scheduled tasks of the Five-Year Plan and construction of not less than 8,000 square meters of housing, setting up the construction of a dispensary, bases of recreation, a Pioneer camp and children's day nurseries of 900,000 rubles of capital expenditures, more than half of them by the use of the organization's own resources. By 1990 the workers are to be provided completely with children's preschool and out-patient institutions.

The subsidiary system is to construct a greenhouse and pig sty to provide each worker with 30 kg of meat and 5 kg of hothouse vegetables and increase the production of meat by a factor of 1.5 and of vegetables by a factor of 6.

The collective of the association directs attention to the workers of the chemical industry with an appeal to develop socialist competition widely for completion ahead of time of the tasks of 1987 and of the 12th Five-Year Plan with great labor successes in honor of the 70th anniversary of the socialist October Revolution.

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UDC 534.6

STUDY OF MOTION OF BUBBLES IN LOW-FREQUENCY ACOUSTICAL FIELDS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 3, Mar 87
(manuscript received 12 Mar 86) pp 822-825

[Article by N. A. Maksimenko, V. S. Shipovskov and M. A. Margulis, Chemistry Faculty, Moscow State University imeni M. V. Lomonosov, All-Union Scientific Research Institute of Organic Synthesis, Moscow]

[Abstract] Results are presented from a study of the motion and interaction of bubbles in low-frequency acoustical fields. Motion pictures were taken at 4000 frames per second with side illumination. Oscillations at 100-250 Hz caused microscopic bubbles to accumulate, gradually forming spherical accumulations, from which larger deformed bubbles were produced, pulsating at the frequency of the acoustical oscillations, with jets of liquid periodically breaking off, filled with small spherical bubbles moving at speeds of up to about 10 m/s. Oscillations of bubbles arise between the large bubbles and the radiator. Spherical cavitation bubbles are influenced by forces due to the movement of the liquid and forces arising upon pulsation of the large bubbles in the liquid. Bent and V-shaped bubble trajectories were observed because of a horizontal component of motion present in addition to the vertical component caused by the vibrator. Figures 3; references 4: 2 Russian, 2 Western.

6508/5915
CSO: 1841/290

UDC 539.216.2:546.26-162:539.217.1

POROUS STRUCTURE OF CARBON FILMS OBTAINED BY PRECIPITATION FROM HYDROCARBON PLASMA

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 3, Mar 87
(manuscript received 21 May 86) pp 835-837

[Article by M. L. Orlov, V. M. Yelinson and V. Ye. Kochurikhin, Moscow Chemical Engineering Institute imeni D. I. Mendeleyev]

[Abstract] The pore structure of films is frequently analyzed by adsorption methods. This article studies the pore structure of carbon surface films obtained under various precipitation conditions in a vacuum of 10^{-1} Pa from

cyclohexane vapor in a glow discharge on polished plates of silicon single crystals. Some films were bombarded with streams of argon ions during application. There are little variation in total surface area with film thickness, indicating absence of micropores accessible for adsorption. Increasing the temperature from 300 to 400°C results in a significant increase in total film surface of the film not bombarded with argon ions. A further increase to 450°C had little additional influence on surface. The film bombarded with ions shows some increase in total surface, which varies little with temperature. The carbon films thus have a micropore structure, with mean effective diameter 8Å. Figures 2, references 4: 3 Russian, 1 Western.

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UDC 541.183.26:546.161

ADSORPTION OF WATER VAPOR AND GASES TO BIOPOLYMERS. PART 2. INFLUENCE OF PRELIMINARY BIOPOLYMER HYDRATION ON ADSORPTION OF GASEOUS HYDROGEN CHLORIDE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 1, Jan 87
(manuscript received 29 Apr 85) pp 154-158

[Article by F. B. Sherman, G. N. Shikhaleeva and B. M. Kats, Scientific Research Institute of Physics, Odessa State University imeni I. I. Mechnikov]

[Abstract] A study was conducted on the effects of preliminary hydration (ΔW) of several biopolymers (bovine serum albumin, alpha-chymotrypsin, chymotrypsinogen, dextran T-20) on the adsorption parameters of gaseous HCl. Assessment of the adsorption isotherms demonstrated an adsorption threshold (a_t), beyond which apparent adsorption ($a_{app} = a - a_t$) was independent of surface structure of the proteins. Below a_t , HCl adsorbed to free and hydrated polar groups on the biopolymers. Two putative mechanisms were advanced for the adsorption of gaseous HCl. At $\Delta W < n_z$ (n_z = concentration of ionogenic groups) HCl is absorbed partially to hydrated polar centers of the biopolymer surface. At $\Delta W > n_z$ adsorption involves fully hydrated regions of the biopolymers. Figures 2; references 14: 7 Russian, 7 Western.

12172/5915
CSO: 1841/320

LIPOSOMAL TURBIDITY SPECTRA: SIMULTANEOUS DETERMINATIONS OF SIZE AND CONCENTRATION

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 1, Jan 87
(manuscript received 5 Nov 85) pp 220-224

[Article by M. V. Genkin, B. P. Ulanov, O. Ye. Dotsenko and R. M. Davydov,
Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] Turbidimetric studies were conducted with monolayer lecithin liposomes (500 nm, 20°C), which demonstrated that through the use of standard curves both the size of the spherical liposomes and their concentration can readily be determined. Extinction coefficients are presented for liposomes ranging in diameter from 300 to 1100 Å. Experimental measurements were confirmed by derived equations based on conventional approaches to turbidometric studies. Figures 4; references 16: 5 Russian, 11 Western.

12172/5915
CSO: 1841/1041

OPTICAL PROPERTIES OF COLLOIDAL PARTICLES OF COPPER IN GLASSES

Leningrad FIZIKA I KHIMIYA STEKLA in Russian Vol 13, No 1, Jan-Feb 87
(manuscript received 3 May 85) pp 50-54

[Article by D. G. Galimov, A. M. Gubaydullina and A. I. Neych, Kazan Aviation Institute imeni A. N. Tupolev]

[Abstract] Information was gained on the nature of the dyes in copper-ruby glasses by comparing experimental and calculated optical spectra. Glasses used in the study were produced in a laboratory electric furnace at 1200°C, 6 hours, after which the glasses were heat treated at 600°C for 10-40 minutes. Calculated and experimental data agreed well for borosilicate glasses, with slight differences for borogermanate glasses, indicating that the dyes in the copper-ruby glasses studied are colloidal particles of metallic copper, that the colloidal particle in borosilicate glasses are near spherical in shape with little variation in dimensions, and that there is some dispersion of shape and size of the colloidal particles in the borogermanate glasses. Segregation of copper, cluster formation and the development of metal colloidal particles are considered stages in a single process. Theoretical spectra were constructed using the equations of M_i for spherical colloidal particles considering their dimensions and the index of refraction of the glasses. Their comparison with experimental values were used to estimate the radius of the colloidal copper particles. Figures 3; references 24: 12 Russian, 12 Western.

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CSO: 1841/341

PRODUCTION OF METAL-POLYMER COATINGS: TWO-PRONG TECHNIQUE

Moscow KHIMIYA I ZHIZN in Russian No 2, Feb 87 pp 32-35

[Article by Doctor of Chemical Sciences Yu. F. Deynega]

[Abstract] This article discusses the history of and recent developments relating to electrolysis and electrophoresis. The Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, UkSSR Academy of Sciences, has been studying simultaneous precipitation of polymers by electrophoresis and electrochemical separation of metals from colloidal dispersions or polymer solutions in dilute electrolytes containing ions of the metal being precipitated. The metal-polymer coatings created by this "Train with two locomotive," process consist of a polymer medium containing a highly dispersed metal phase. Since the metal particles do not enter the polymer from without but rather are formed directly in it, there is a chemisorption interaction between the polar groups of macromolecules and the active surface of the metal, producing an exceptionally-elastic coating with excellent adhesion to the substrates. The metal makes the coatings good conductors of electricity and heat. By acting on the composition of the liquid phase, the properties of the coating can be widely varied: a compact coating in which metal microspheres are densely and uniformly packed in a polymer matrix, or a polymer filler in a metal matrix. Figures 3, references 2 (Russian)

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CSO: 1841/312

UDC 536.46

PARAMETERS OF SHOCK WAVES IN AIR WITH RAPID COMBUSTION OF HYDROGEN-AIR MIXTURE

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 6, No 3, Mar 87
(manuscript received 27 Mar 86) pp 398-402

[Article by Yu. A. Gostintsev, S. A. Gubin, I. V. Kovtun and V. V. Shargatov, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] A study is reported of a spherical volume of gaseous hydrogen surrounded by air. An equation is presented for the change in profile of hydrogen concentration in the charge as it burns rapidly. A set of equations for processes approximating the results of thermodynamic calculation of isentropic expansion of the detonation product is used to describe the status of the fuel mixture detonation products. The calculations show that estimation of the parameters of shock waves at considerable distance can be performed using an equation for homogeneous fuel-air mixture compositions. The fraction of chemical heat expended in isentropic expansion of the products upon detonation is calculated as a function of time of formation of the hydrogen-air mixture. Figures 5; references 8: 4 Russian, 4 Western.

6508/5915
CSO: 1841/313

UDC 536.47+534.222.2

ROLE OF RADIATION IN ACCELERATION OF COMBUSTION OF LARGE VOLUMES OF GAS

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 6, No 3, Mar 87
(manuscript received 15 Mar 85) pp 403-406

[Article by V. A. Gorev and V. N. Fedotov]

[Abstract] Turbulization of the fuel mixture due to the interaction of the flow of gas moving in advance of the flame front is considered to be the major mechanism of development of strong explosions of large clouds of gas. The origin of high combustion-speeds in the explosions of large gas-air mixtures has not been studied. This article presents an approximate estimate of the influence of radiation of the combustion products on the speed of combustion of gases containing inert particles. It is found that the mechanism of

propagation of explosive combustion by ignition of the mixture in advance of the main flame front by particles suspended in the mixture which absorb radiant energy from the flame may yield high combustion-speeds. The mechanism can occur only in large-scale phenomena, since the total radiation flux from a large flame area is greater and the maximum radiation flux at the surface of a flame increases with increasing volume of combustion products, approximating the radiation flux from a black body at the temperature of the flame. Only large-scale experiments can give the final answer to the question of the contribution of radiation from the flame to the mechanism of explosive combustion.

Figure 1; references 8: 3 Russian, 5 Western.

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CSO: 1841/313

UDC 541.138.3

MECHANISM OF CATHODIC REDUCTION OF OXYGEN IN CARBON CARRIER-LACCASE
ENZYME SYSTEM

Moscow ELEKTROKHIMIYA in Russian Vol 23, No 3, Mar 87
(manuscript received 27 Jun 85) pp 375-380

[Article by V. A. Bogdanovskaya, A. M. Kuznetsov, M. R. Tarasevich and Ye. F. Gavrilova, Institute of Electrochemistry imeni A. N. Frumkin, USSR Academy of Sciences, Moscow]

[Abstract] The ability of enzymes immobilized on an electrode to accelerate electrode processes has been shown for many reactions. This article studies the influence of electrolyte temperature and laccase inhibitor on the rate of the reaction of cathodic reduction of oxygen over a broad range of potentials with various solution pH and oxygen pressures. Measurements were performed with laccase immobilized by adsorption on carbon black. Electrochemical measurements were performed in a three-electrode cell. A mechanism is suggested for the reaction in which electron transfer, from an active enzyme center to the oxygen molecule, is the limiting stage in the area of low polarizations. With high current, the slowest stage is the formation of the enzyme-substrate complex. Figures 5, references 10: 4 Russian, 6 Western.

6508/5915
CSO: 1841/327

UDC 541.138.2

INFLUENCE OF ADDITIVES ON ANODIC OXIDATION OF LITHIUM IN SOLUTION OF ITS
HYDROXIDE. LITHIUM CHLORIDE AND SULFATE SALTS

Moscow ELEKTROKHIMIYA in Russian Vol 23, No 3, Mar 87
(manuscript received 12 May 85) pp 412-415

[Article by N. V. Korovin, I. I. Rovnaya, S. Ye. Smirnov and A. A. Morgunov, Moscow Institute of Power Engineering]

[Abstract] The concentration of lithium hydroxide has the greatest influence on the anodic behavior of lithium in an alkaline solution. This article studies the influence of lithium chloride and sulfate on the process of anodic oxidation of lithium in a solution of its hydroxide. Potentiostatic and

potentiodynamic methods of investigation were used in a standard electrochemical cell. The addition of lithium salts to the solution of its hydroxide is found to have a complex influence on the thickness and porosity of films on the surface of the lithium, on the rate of liberation of hydrogen and anodic oxidation of lithium. The mechanism of this complex effect is not known. The reaction rate varies in the same manner as a function of concentration of both additives, and the additives have the same influence on film thickness and porosity, indicating that their influence is by a common mechanism, possibly by adsorption, participation in an elementary act, formation of complexes, etc. Figures 2; references 5: 3 Russian, 2 Western.

6508/5915
CSO: 1841/327

UDC 546.43.93+541.91:54-31.04

$\text{Li}_2\text{O}-\text{RuO}_2$ SYSTEM

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 3, Mar 87
(manuscript received 24 May 85) pp 746-748

[Article by I. S. Shaplygin, M. I. Gadzhiyev and V. B. Lazarev, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences]

[Abstract] Oxygen-containing platinum compounds are used in the electrical and electronics industry as semiconductors, catalysts, and electrodes in melts. This article presents a physical-chemical study of the state diagram of the system $\text{Li}_2\text{O}-\text{RuO}_2$ and constructs a phase diagram of the system. Specimens were obtained by solid phase heating of a mixture of powdered carbonates of lithium preliminarily dried at 200°C for 3 hours and ruthenium dioxide, in air. Two compounds were formed in the system. Li_8RuO_6 and Li_2RuO_3 . Li_8RuO_6 , here reported for the first time, exists in two modifications which do not convert to each other upon exposure to heat or heat and radiation below the melting point. All the compounds are stable up to 1500°C . Variable composition bronzes also resistant to 1500°C and having clearly expressed metal conductivity are found in the area rich in ruthenium dioxide. A phase diagram of the system is presented. Figure 1; references 4: 1 Russian, 2 Western.

6508/5915
CSO: 1841/321

CHANGE IN PHOTSENSITIVITY OF METAL DEUTEROPORPHYRIN COMPLEXES UPON INTRODUCTION OF SUBSTITUENTS TO PYRROLE RINGS

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 6, No 3, May 87
(manuscript received 21 Mar 86) pp 316-319

[Article by V. A. Ilatovskiy, V. M. Rudakov and G. G. Komissarov, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] A study is reported of the influence of donor-acceptor properties of substituents on the photovoltaic properties of pigments. The photoactivity of porphyrins was estimated from the photopotentials and photocurrents of pigmented electrodes in contact with an electrolyte relative to a standard silver chloride electrode. Illumination was provided by a stabilized xenon lamp with 50 mm water thermal filter. The characteristics of 9 metal complexes of deuteroporphyrin with substituents in position 2 of pyrrole ring I and positions 3 and 4 of ring II were studied. The potential and current of the films increased upon transition from elements with purely covalent bonding with the ligand (Co) to elements with almost ionic bonding (Mg). A decrease in electron density at the central atom causes redistribution of the charged and uncharged forms of adsorption of electron acceptors in the electrolyte and interacting with the pigment film surface. A decrease in the fraction of the charged form of adsorption decreases the dark catalytic activity of the semiconductor, but increases its light activity. Figures 2; references 8: 7 Russian, 1 Western.

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UDC 546.3.621.3

INFLUENCE OF METAL IMPURITIES ON KINETIC CHARACTERISTICS OF HYDROGEN ELECTRODE OF LEAD-HYDROGEN BATTERY

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 12, Dec 86
(manuscript received 19 Aug 85) pp 2670-2674

[Article by O. A. Burmistrov, N. Yu. Lyzlov and M. A. Dasoyan]

[Abstract] A lead-hydrogen battery is a representative of a new group of chemical sources of current, sources known as metal-gas batteries. These batteries utilize a lead-dioxide electrode as the positive electrode, while the negative electrode is a bifunctional gas-diffusion hydrogen electrode performing both cathodic and anodic processes during charging and discharging of the battery. The authors studied the effect of the addition of Pb, Sb, Sn, Cu and Fe to the electrolyte on the kinetic characteristics of the hydrogen electrode. The volt ampere diagrams produced indicate that when the cations

Pb(II), Sn(II) and Fe(II) are present in the electrolyte, there is some decrease in the quantity of both firmly and weakly-bonded hydrogen, which is replaced by adatoms of the cited metals. This effect is significant in the case of Sn(II), causing irreversible adsorption of Sn(II) cations onto the surface of the platinum. Cu(II) and Sb(III) form precipitates on the electrode surface. The presence of Sn(II), Cu(II) and Sb(III) must be avoided, since it eventually causes failure of the hydrogen electrode. Pb(II) and Fe(II) were not found to have a harmful effect on the characteristics of the hydrogen electrode. Figures 2; references 6: 4 Russian, 2 Western.

6508/5915
CSO: 1841/314

UDC 621.785.53

INFLUENCE OF ANODIC POLARIZATION ON SPONTANEOUS TRANSITION OF METAL FROM
SALT MELT TO PROTECTED PART DURING CHEMICAL-HEAT TREATMENT

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 12, Dec 86
(manuscript received 28 Apr 85) pp 2725-2727

[Article by Yu. V. Novokreshchenov, O. S. Petenev and Yu. N. Kositsyn]

[Abstract] The possibility is demonstrated of producing a single-phase boride coating on type U-8 steel and a single-phase beryllium coating on copper by regulating the DC anode voltage in a O-current method involving immersion of the part to be protected into melted salts containing saturating components. The anodic polarization of the protected part in the melted salts is found to allow regulation of the process of O-current transfer of the metal, expanding the capabilities of producing diffusion coatings. References 4 (Russian).

6508/5915
CSO: 1841/314

UDC 541.118.123:546.65'73'21

OXYGEN NONSTOICHIOMETRY OF LANTHANUM, PRASEODYMIUM AND NEODYMIUM
COBALTATES WITH PEROVSKITE STRUCTURE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 3, Mar 87
(manuscript received 17 Jul 85) pp 630-637

[Article by A. N. Petrov, V. A. Cherepanov and A. Yu. Zuyev, Urals State
University imeni A. M. Gorkiy, Sverdlovsk]

[Abstract] A study is reported of the nature and quantitative parameters of oxygen nonstoichiometry of lanthanum, praseodymium and neodymium cobaltates at 1272-1773 K, partial oxygen pressure less than one atmosphere. Measurements were performed by high temperature gravimetry with p_{O_2} created by the use of helium-air mixtures. The functional dependences of concentration of oxygen vacancies on external thermodynamic parameters were determined. The thermodynamic characteristics of defect-formation processes were calculated. Limiting values of oxygen nonstoichiometry of complex oxides $LnCoO_{3-\delta}$ were established and standard Gibbs energies of the processes of their formation from simple oxides were refined. Figures 4; references 14: 6 Russian, 8 Western.

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UDC 541.11:546.273.171

THERMODYNAMIC CHARACTERISTICS OF CUBIC BORON NITRIDE AT 298-930 K

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 3, Mar 87
(manuscript received 31 Oct 85) pp 801-803

[Article by V. L. Solozhenko, I. Ya. Chaykovskaya, A. N. Sokolov and A. A. Shulzhenko]

[Abstract] Thermodynamic characteristics of cubic boron nitride crystals were determined in the temperature interval 298-930 K. β -BN single crystals were synthesized in the area of spontaneous crystallization from a multicomponent reaction mixture at high static pressures and temperatures. X-ray diffraction and IR spectroscopy were used to determine that the content of α -BN in

the single crystals produced was not over 0.1 mass percent. Coefficients were calculated for equations approximating the temperature dependence of heat capacity, entropy and adjusted Gibbs energy of the cubic boron nitride in the temperature interval studied. References 5: 2 Russian, 3 Western.

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CSO: 1841/290

UDC 666.296.004.12

INFLUENCE OF CERTAIN OXIDES ON PROPERTIES OF TITANIUM GLAZES

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 87
(manuscript received 5 Jun 86) pp 40-42

[Article by A. P. Irkakhodzhaeva and N. A. Sirazhiddinov, Institute of Chemistry, Uzbek SSR Academy of Sciences]

[Abstract] Studies have established the optimal composition of a low-titanium protective glaze (wt. percent): 65.4 SiO₂; 7.06 Al₂O₃; 3.54 B₂O₃; 5.23 CaO; 1.63 ZnO; 2.44 K₂O; 5.58 Na₂O; 8.65 TiO₂. This glaze is more thermally-stable and provides good surface quality. Additional studies were performed to determine the variation and physical-chemical properties of titanium-containing glazes as functions of composition, with all oxides introduced at 5-20 mol.% at intervals of 5 mol.%. Silica was also introduced at 55-70 mol.%. It was found that, up to 10 mol.%, Al₂O₃ improves sealing properties, 75% SiO₂ increases the melting point and viscosity of the glaze. At 20% B₂O₃, the lower melting interval merges with the upper interval, and at 1050°C the coating becomes transparent. Figure 1; references 9 (Russian).

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UDC 546.7'+546.123

PHYSICAL-CHEMICAL STUDY OF MOLYBDENUM THIOIODIDES Mo₆S₄I_{6-x} AND Mo₄S_{4-y}I_{4-x}

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 3, Mar 87
(manuscript received 20 Jun 85) pp 557-561

[Article by V. V. Starkov, D. V. Drobot and Ye. A. Pisarev, Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov]

[Abstract] The molybdenum thioiodides include compounds with superconducting and ferromagnetic properties, stimulating studies of their physical-chemical properties and attempts to determine the relationship of composition and

properties. This article studies the physical-chemical properties and thermal stability of phases of variable composition $\text{Mo}_4\text{S}_{4-y}\text{I}_{4-x}$ and $\text{Mo}_6\text{S}_4\text{I}_{6-x}$ by the methods of differential thermal analysis, thermogravimetric analysis, tensimetric, x-ray phase and chemical analyses. The studies show that in many molybdenum thioiodides, as iodine is replaced with sulfur the Mo-M separation distance within clusters increases, while VEG decreases. The thermal properties of the compounds remain practically unchanged, only the phase $\text{Mo}_6\text{S}_{6-y}\text{I}_{2-x}$ having increased stability. Decomposition of the thioiodides in a vacuum up to 900°C is accompanied by liberation of iodine, with further decomposition resulting in the formation of two-phase, then three-phase specimens. The end products of decomposition are Mo and Mo_2S_3 . Figures 4; references 14: 5 Russian, 9 Western.

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CSO: 1841/321

UDC 546.92/3+546.873-31541.12.3.2.04

$\text{Bi}_2\text{O}_3\text{-Rh}_2\text{O}_3$ SYSTEM

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 3, Mar 87
(manuscript received 24 May 85) pp 749-752

[Article by I. S. Shaplygin, I. I. Prosychev and V. B. Lazarev, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences]

[Abstract] Previous studies have reported synthesis of a rhombic phase BiRhO_3 with distorted perovskite structure by reaction of Bi_2O_3 and Rh_2O_3 at 65 kbar, 1000°C . This article studies the phase relationships in the system $\text{Bi}_2\text{O}_3\text{-Rh}_2\text{O}_3$ in air throughout the entire range of concentrations. Specimens were made by the usual ceramic technology from oxides at intervals of 5 mol.%, 1-2 mol.% at the edges of the diagram and near the compound. The compound is found to have the composition $\text{Bi}_2\text{Rh}_2\text{O}_6$ with pyrochlore structure. There is just one eutectic in the system, at 85 mol.% Bi_2O_3 , 15 mol.% Rh_2O_3 , melting point $775\pm 5^\circ\text{C}$. The phase diagram is presented. Figures 2; references 4: 3 Russian, 1 Western.

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CONDUCTIVITY OF $\text{Na}_2\text{O-SiO}_2\text{-NaHd}$ MELTS (Hd = F, Cl)

Leningrad FIZIKA I KHIMIYA STEKLA in Russian Vol 13, No 1, Jan-Feb 87
(manuscript received 5 Jun 85) pp 40-44

[Article by I. B. Bobylev, V. N. Anfilogov and N. A. Zyuzeva, Institute of Geology and Geochemistry, imeni A. N. Zavaritskiy, Urals Science Center, USSR Academy of Sciences, Sverdlovsk]

[Abstract] A study was made of the electrical conductivity of $\text{Na}_2\text{O-SiO}_2\text{-NaCl}$ melts by the ac bridge method using a three-electrode platinum cell consisting of two central 1 mm diameter electrodes and an outer circular electrode, all rigidly mounted to a holder and immersed in the melt in a platinum crucible. The conductivity was found to depend upon the structural position of the salt component in the silicate melt. The type of anion introduced with the halide [Hd] is significant, since it determines the process of complex-formation and the type of ion which is the basic current carrier. Addition of sodium halides to a silicate melt greatly decreases conductivity, with a minimum at a content of about 10 mol.% of the salt component. The activation energy of conductivity simultaneously decreases sharply. The decrease in conductivity results from a decrease in the actual number of particles participating in the current carrying process. This is explained in $\text{Na}_2\text{O-SiO}_2\text{-NaCl}$ melts by the formation of a microheterogeneous structure. In $\text{Na}_2\text{O-SiO}_2\text{-NaF}$ melts, the number of carriers is decreased due to complex formation of the salt component. At the same time, a decrease occurs in the degree of dissociation of the silicate complexes. Figures 3; references 10: 9 Russian, 1 Western.

6508/5915

CSO: 1841/341

INFLUENCE OF Ce ON CHANGE IN ABSORPTION OF HIGH PURITY SODIUM-CALCIUM-SILICATE GLASSES IN 0.8-1.6 eV AREA UNDER INFLUENCE OF γ -RADIATION

Leningrad FIZIKA I KHIMIYA STEKLA in Russian Vol 13, No 1, Jan-Feb 87
(manuscript received 8 Apr 85) pp 123-126

[Article by L. B. Glebov, V. G. Dokuchayev and G. T. Petrovskiy]

[Abstract] A study is presented of the possibility of increasing the radiation optical stability of sodium-calcium-silicate glasses in the 0.8-1.6 eV range by introducing variable-valence impurities. All studies were performed on large specimens to avoid the possible influence of drawing of fibers. It was found possible to produce low-absorption (less than 100 dB/km) sodium-calcium-silicate glasses containing one weight percent CeO_2 . Cerium effectively

suppresses the formation of hole centers in the glasses which absorb in the 0.8-1.6 eV band. Due to this and the slowing of the process of radiation reduction of iron, the absorption induced by radiation 0.8-1.6 eV decreases by one to two orders of magnitude. Figures 2; references 12: 11 Russian, 1 Western.

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UDC 537.534:535.39

OPTICAL AND CONCENTRATION CHARACTERISTICS OF SURFACE LAYERS OF SODIUM BOROSILICATE GLASS CONTAINING TERBIUM OXIDE

Leningrad FIZIKA I KHIMIYA STEKLA in Russian Vol 13, No 1, Jan-Feb 87
(manuscript received 20 Mar 86) pp 137-140

[Article by A. V. Mishin, V. I. Pshenitsyn, N. Kh. Kholdarov, A. G. Banshchikov and G. V. Savinova]

[Abstract] A study was made of the optical and concentration characteristics of polished surfaces of glass containing (mol.%): SiO_2 --60.3, Na_2O --22.2, B_2O_3 --9.9, Tb_2O_3 --6.9, plus small quantities of oxides of cerium and tin. The surfaces underwent the standard set of optical grinding and polishing operations in an aqueous medium. Ellipsometric measurements revealed a thin surface layer with an effective index of refraction less than that of the bulk specimen. The differences are explained by concentration profiles in the surface layers. In order to construct the full profile of index of refraction, the system must be considered a two-layer system, with a zone of sharp change of effective index of refraction adjacent to an extended layer with smoother change in index of refraction, adjacent, in turn, to the bulk specimen. Figures 2; references 9: 6 Russian, 3 Western.

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CSO: 1841/341

RESTORATION AND EXPLOITATION OF CERAMICS

Moscow KHIMIYA I ZHIZN in Russian No 2, Feb 87 pp 50-51

[Article by Yu. M. Yevdokimov, Candidate of Chemical Sciences, and D. S. Krestov, Engineer]

[Abstract] Gluing and other methods of repair of ceramics is discussed, including the use of common adhesives, epoxy resins, joining of ceramic parts by placing them in contact with each other with a polyethylene film between

which is then melted by heating to join the parts. Ceramics can also be joined with metals and other ceramics by cold welding, diffusion welding and chemical welding. Electrode adhesion methods can join ceramics or glass to metal.

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UDC 539.234

THERMAL STABILITY OF GERMANIUM NITRIDE IN VACUUM

Tbilisi IZVESTIYA AKADEMII NAUK GRUZINSKOY SSR: SERIYA KHIMICHESKAYA
in Russian Vol 12, No 4, Oct-Dec 86 (manuscript received 14 Jan 85)
pp 272-277

[Article by G. D. Bagratishvili, R. B. Dzhanelidze and I. G. Nakhutsrishvili,
Institute of Cybernetics, Georgian Academy of Sciences]

[Abstract] A study is presented of the thermal stability of germanium nitride considering possible processes of its dissociation, disproportionation and sublimation. The interest in Ge_3N_4 results from its creation of a perfect phase division boundary with semiconductors, including semiconductor compounds $\text{A}^{\text{III}}\text{B}^{\text{V}}$. Studies were performed on germanium nitride produced on the surface of germanium by interaction with hydrazine vapor at 720°C . The product of nitriding germanium with hydrazine is a light brown friable powder with rhombic structure and lattice parameters $a = 13.84\text{\AA}$, $b = 9.06\text{\AA}$, $c = 8.18\text{\AA}$. The IR spectrum of the substance contains two intensive bands at 738 and 773 cm^{-1} , and weaker peaks at 794 , 845 and 880 cm^{-1} . Figures 3; references 11: 6 Russian, 5 Western.

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CSO: 1841/343

UDC 666.11.01:666.112.2:537.311.3

INFLUENCE OF OXIDES OF IRON AND NIOBIUM ON POLYALKALINE EFFECT OF ELECTRIC CONDUCTIVITY IN $(\text{Na}, \text{K})_2\text{O}-\text{BaO}-\text{SiO}_2$ GLASSES

Tbilisi IZVESTIYA AKADEMII NAUK GRUZINSKOY SSR: SERIYA KHIMICHESKAYA
in Russian Vol 12, No 4, Oct-Dec 86 (manuscript received 31 Jul 84) pp 283-287

[Article by V. Ye. Kogan, G. G. Mahvelidze, I. A. Myasnikov and A. A. Pronkin,
Institute of Cybernetics, Georgian SSR Academy of Sciences]

[Abstract] It has been shown that the introduction of oxides of iron instead of SiO_2 to bialkaline silicate glasses containing alkali earth metal oxides leads to disappearance of the extreme of $\log \sigma_v = f(\beta_k)$, where $\beta_k = [\text{K}]/([\text{Na}]+[\text{K}])$.

or, in other words, to disappearance of the polyalkaline effect. One possible reason for the disappearance might be the development in the glasses of an electron conductivity component. This article studies glasses of the basic composition: $16\%(\text{NaK})_2\text{O} \cdot 13.5\%\text{BaO} \cdot 70.5\%\text{SiO}_2$, with niobium oxide representing the vanadium subgroup to replace SiO_2 . The studies indicate ionic conductivity of polyalkaline silicate glasses containing oxides of iron at 80-420°C. The polyalkaline effect disappears in glasses with total volumetric concentration of alkaline ions of at least $8 \cdot 10^{-2} \text{ mol/cm}^3$, simultaneously with formation in the glasses of a $\text{Me}^+\text{O}^-\text{Xo}_{3/2}$ and $\text{Me}^+[\text{Y}^-\text{O}_{4/2}]$ structural units, in which the interaction of the alkaline ion with the anion portion of the structural unit is different. Figure 1; references 19: 18 Russian, 1 Western.

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CSO: 1841/343

UDC 541.147+548.73

HIGHLY CONCENTRATED ACTIVE NONLINEAR MEDIA BASED ON OXIDES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 1, Jan 87
(manuscript received 3 Mar 86) pp 97-99

[Article by D. V. Bakin, L. M. Dorozhkin, Yu. I. Krasilov, N. T. Kuznetsov, A. V. Potemkin (deceased), Kh. S. Tadzhi-Aglayev and A. V. Shestakov, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences, Moscow]

[Abstract] Creation of highly-concentrated active nonlinear media containing an active ion as a component of the structure is one promising means for miniturization of solid-state lasers. This article studies a number of important characteristics of such media based on oxide compounds of neodymium phosphates, niobates, tantalates and titanates with alkali-earth metals. Single crystals of good optical quality 5-8 mm in length were grown of the selected materials and preliminary measurements of laser and nonlinear-optical parameters performed. The quality of the materials was evaluated based on a parameter $\xi = N\sigma\tau\kappa$, where σ is the cross section of the radiating transition, κ is the relative conversion factor of radiation to the second harmonic with phase synchronism, N is the number of active centers per cubic centimeter and τ is the lifetime of the luminescent level. The best of the materials studied were lanthanum-neodymium titanotantalates and titanoniobates. The criterion is suggested for future use in the search for promising laser materials. References 15: 8 Russian, 7 Western.

6508/5915
CSO: 1841/165

MECHANISM OF FORMATION OF ALUMINUM AND GALLIUM GARNETS OF RARE-EARTH ELEMENTS FROM MIXTURES OF OXIDES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 1, Jan 87
(manuscript received 14 Mar 86) pp 114-117

[Article by S. Yu. Zinovyev, V. A. Krzhizhanovskaya, V. B. Glushkova, S. Kh. Batygov, Ye. V. Zharikov and V. A. Myzina, Institute of Silicate Chemistry imeni I. V. Grebenshchikov, USSR Academy of Sciences, Leningrad]

[Abstract] A study was performed of the sequence of formation of phases upon synthesis of the compounds $\text{Ln}_3\text{M}_5\text{O}_{12}$ (where $\text{M} = \text{Al, Ga}$) from a mixture of oxides over a broad temperature range, as well as the conditions of production of individual compounds. The initial materials used were rare-earth element oxides of at least 99.95% purity, aluminum oxide and gallium oxide. Diffusion was studied in polycrystalline specimens by microscopic x-ray spectral analysis. Interaction of the rare-earth oxides with aluminum and gallium oxides occurred by preferential diffusion of Al or Ga in the Ln_2O_3 . Consequently, in all cases the initial reaction product is a compound richest in the rare-earth oxide. The beginning of significant interaction of Ln_2O_3 with $\alpha\text{-Al}_2\text{O}_3$ is in the 900-1100°C interval, initially forming $\text{Ln}_4\text{Al}_2\text{O}_9$. The sequence of formation of phases in the synthesis of the garnets is traced. The formation of $\text{Ln}_3\text{Al}_5\text{O}_{12}$ and $\text{Ln}_3\text{Ga}_5\text{O}_{12}$ is shown to be a multistage reaction. The composition of intermediate products depends on the ionic radius of the particular lanthanide involved. Figure 1, references 9: 6 Russian, 3 Western.

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UDC 537.525

CHANGES IN CHEMICAL COMPOSITION OF MIXTURE IN STATIONARY DISCHARGE
WITH TRANSVERSE GAS STREAM

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 21, No 2, Mar-Apr 87
(manuscript received 12 Feb 85) pp 178-182

[Article by G. A. Baranov, V. I. Grad, A. K. Zinchenko and M. G. Lednev,
Scientific Research Institute of Electrophysical Apparatus imeni D. V.
Yefremov]

[Abstract] An analysis was conducted on the changing composition of a CO_2 , N_2 , CO , and H_2 mixture at 67 gPa with transverse gas flow and a 5.8 mA/cm^2 current at $E/N = 2.4 \times 10^{-16} \text{ V}\cdot\text{cm}^2$. Measurements conducted over 2 h revealed changes in the concentration of the stable and unstable components in the closed circuit mode, leading to a proposed series of chemical reactions to explain the changes. During the initial 5-10 min the concentration of CO_2 decreased, while that of CO and O_2 increased. Subsequently, a slow recovery [CO_2] was evident, approaching the starting level, while the concentrations of CO and O_2 diminished. Tabular data are presented on a series of reactions and their rate constants that would account for the changes in the concentration of CO_2 , CO , and O_2 under the experimental conditions. The proposed model assumes dissociation of CO_2 as a result of an electronic impact, and recovery as a result of the rapid $\text{OH} + \text{CO} \rightarrow \text{CO}_2 + \text{H}$ reaction. The rate constant for the dissociation of CO_2 was calculated at $3 \times 10^{-11} \text{ cm}^3/\text{sec}$. Figures 3; tables 2; references 20: 9 Russian, 11 Western.

12172/5915
CSO: 1841/328

FULFILLMENT OF GLANSDORF-PRIGOZHIN EVOLUTION CRITERIA FOR RAYLEIGH GAS WITH CHEMICAL REACTION AND EXTERNAL PARTICLE SOURCE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 1, Jan 87
(manuscript received 12 Feb 86) pp 263-267

[Article by P. A. Tadzhibayev, Institute of Nuclear Physics, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] Nonstationary analytical solution was obtained for the Fokker-Planck equation for a Rayleigh gas with a chemical reaction and a monoenergetic source of heavy particles. The mathematical presentations demonstrated that under conditions of dynamic equilibrium a high-temperature stationary state is established, fulfilling the Glansdorf-Prigozhin criterion for evolution. The criterion itself is an expression of the Le Chatelier-Brown principle applicable to nonlinear thermodynamics of irreversible processes. Figures 1; references 15: 8 Russian, 7 Western.

12172/5915
CSO: 1841/320

INFLUENCE OF NOZZLE SHAPE ON DISTRIBUTION FUNCTION OF MOLECULES AMONG VIBRATIONAL LEVELS IN STREAM OF H_2 -HCl

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 6, No 3, May 87
(manuscript received 11 Jan 86) pp 291-298

[Article by I. P. Kirmusov, V. A. Levin and A. M. Starik]

[Abstract] An analysis is presented of the influence of nozzle shape on the formation of nonequilibrium distribution of HCl molecules among oscillating levels in an expanding jet of a mixture of H_2 and HCl. Vibrations of the HCl molecules were modeled by means of a Morse oscillator, H_2 molecules by means of a harmonic oscillator. It was assumed that the oscillating levels of the molecular hydrogen were populated in accordance with the Boltzman distribution. Only single-quantum transitions were considered. Several types of nozzles were studied: Wedge-shaped, characteristic, exponential and special nozzles with double expansion containing a long, constant, cross section channel, (suggested in "Advanced H_2 HCl Gas Dynamical Laser. Phase I, II. Final Technical Report," Atlantic Research Corp, Alexandria, VA, report number ARC-47-5655, 1976), which achieved the greatest difference in distribution function from the Boltzman distribution and the highest gain. Optimal geometric dimensions for this type of nozzle are calculated, producing the greatest reserve of quanta in hydrogen chloride molecules, 1.5-2 times greater than in exponential and characteristic nozzles. Figures 5; references 15: 8 Russian, 7 Western.

6508/5915
CSO: 1841/313

KINETICS OF ELECTRON-OSCILLATING RELAXATION OF MOLECULES WITH RECOMBINATION EXCITATION

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 6, No 3, May 87
(manuscript received 31 Mar 86) pp 304-309

[Article by V. V. Datsyuk, I. A. Izmaylov and V. A. Kochelap, Kiev State University imeni T. G. Shevchenko; Institute of Semiconductors, UkSSR Academy of Sciences, Kiev]

[Abstract] Atomic recombination reactions have been suggested for chemical visible-light-band lasers. This article studies the kinetics of electron-oscillation relaxation of molecules with recombination excitation considering oscillation relaxation, dissociation, radiative and nonradiative damping of the electron-excited state. Equations are derived for the quantum yield of spontaneous and stimulated radiation. A method is studied for determining the atomic recombination rate constant from experimental data. Specific recombination reactions are analyzed. The concepts here developed can be used to determine the parameters of the kinetics of the electron-oscillation relaxation molecules, to find the spectral distribution of chemiluminescence in atomic recombination reactions and to estimate the prospects for new laser systems. Figures 2; references 20: 9 Russian, 11 Western.

6508/5915
CSO: 1841/313

UDC 539.196.3;541.124.13

DELAYED RECOMBINATION OF IODINE ATOMS

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 6, No 3, May 87
(manuscript received 2 Mar 86) pp 330-337

[Article by V. Yu. Zalesskiy, Institute of Silicate Chemistry imeni I. V. Grebenshchikov, USSR Academy of Sciences, Leningrad]

[Abstract] Iodine atoms recombine to I_2 molecules in triple collisions. In order to determine the nature of the delay in recombination of iodine atoms with small values of $\kappa_m = [I_2]/[M]$, this work has studied the final stage of the recombination process. The mechanism of delay in recombination suggested agrees with experimental data published by other authors. The parameters calculated can be used for rough estimates of recombination speeds as in a photodissociation laser. Figures 4; references 20: 11 Russian, 9 Western.

6508/5915
CSO: 1841/313

PROPAGATION OF NONLINEAR HYDRODYNAMIC DISTURBANCES IN AN OSCILLATION-NONEQUILIBRIUM GAS

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 6, No 3, May 87
(manuscript received 15 Apr 86) pp 385-389

[Article by A. I. Osipov and A. V. Uvarov, Moscow State University imeni M. V. Lomonosov]

[Abstract] The propagation of sound waves in an oscillation-nonequilibrium gas may be accompanied by amplification of the sound. This work has studied the peculiarities of propagation of nonlinear hydrodynamic disturbances in a nonequilibrium gas and formation of a shock wave, related to hydrodynamic processes in the active media of gas lasers. A gas is studied with nonequilibrium reserve of oscillating energy maintained by pumping. A comparative estimate of nonlinear, viscosity and relaxation effects is performed. The evolution of an initial disturbance is traced to triggering, allowing changes in harmonic composition during propagation of the initial disturbance to be studied. The evolution of a disturbance in the area of characteristic frequencies of the initial disturbance is described by a quasilinear equation ignoring viscosity, and the time of establishment of a steady mode is determined. References 9: 7 Russian, 2 Western.

6508/5915
CSO: 1841/313

OBSERVATION OF STEADY INVERSION UPON TRANSFORMATION OF FINE STRUCTURE OF Cl ATOM IN DC DISCHARGE AND HF DISCHARGE IN ICl/Ar MIXTURE BY LMR METHOD

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 6, No 3, May 87
(manuscript received 31 Mar 86) pp 410-411

[Article by A. I. Chichinin and L. N. Krasnoperov, Institute of Chemical Kinetics and Combustion, Siberian Division, USSR Academy of Sciences, Novosibirsk]

[Abstract] A population-inversion has been observed for transition of the fine structure of the Cl atom upon dissociation of ICl molecules by radiation at the second harmonic of a neodymium laser at 530 nm. This inversion can be used to create a laser with chemical emptying of the lower operating level. This article reports observation of a steady inversion at the $2P_{1/2}-2P_{3/2}$ transition of the Cl atom in a DC discharge and an HF discharge in an ICl/Ar mixture. LMR spectra of the Cl atoms in a Cl_2/Ar mixture and ICl/Ar mixture are presented. The LMR spectra show an inverted population density of $2 \cdot 10^{12} \text{ cm}^{-3}$ in both discharges. The gain achieved without a magnetic field present is about 0.1%, two orders of magnitude too low to achieve steady generation. Figure 1; references 9: 5 Russian, 4 Western.

6508/5915
CSO: 1841/313

UDC 553.4:66.022:66.021.97

METHOD OF PRODUCING ALKALI METAL ARSENITES OF ARSENIC-CONTAINING WASTES AND PRODUCTION INTERMEDIATES

Tbilisi IZVESTIYA AKADEMII NAUK GRUZINSKOY SSR: SERIYA KHIMICHESKAYA
in Russian Vol 11, No 3, Jul-Sep 85 (manuscript received 22 Apr 83)
pp 215-219

[Article by R. D. Gigaure, T. M. Gogiashvili and N. Sh. Gigaure,
Tbilisi State University]

[Abstract] There is an excess of arsenic-containing byproducts in industry, which cannot be used without preliminary removal of the arsenic. The solution to the problem must proceed in two directions: extraction of arsenic from wastes and production-intermediates in the form of compounds which can be stored in contact with air and water; and determination of new areas for large tonnage consumption of arsenic and its compounds in various branches of the economy. This article discusses a method for production of alkali metal arsenites from production wastes and intermediates. The method suggested utilizes wastes from the production of nonferrous and noble metals, which are decomposed by alkali solutions to produce arsenites of purity sufficient for technical use. The end products are obtained by treatment, of the products of interaction of high aliphatic alcohols and the cited mixtures with aqueous solutions of the corresponding alkalies. References 8 (Russian).

6508/5915
CSO: 1841/342

STUDY OF INTERACTION OF IRON CARBONYLS WITH ACTIVATED SILICA MATRIX AND EFFECT OF HYDROGEN AND SYNTHESIS GAS ON IRON ELECTRON STATE

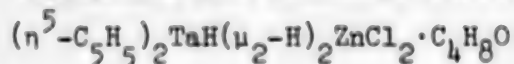
Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 12, Dec 86 (manuscript received 11 Jun 85) pp 2666-2670

[Article by M. V. Tsodikov, Ya. R. Katsobashvili, Ye. V. Slivinskiy, Yu. V. Maksitov, V. V. Matveyev, I. P. Suzdalev, O. G. Ellert and G. F. Ivanova, Institute of Petrochemical Synthesis, imeni A. V. Topchiyev, USSR Academy of Sciences, Moscow]

[Abstract] Continuing a previous article, the authors report study of the mechanism of interaction of iron carbonyls with activated silica and the influence of the effect of H_2 and CO/H_2 on the electron state of the iron contained in the structure of the matrix. It was found that the interaction of iron carbonyls with the activated silica matrix resulted in decomposition of complexes and preferential formation of ferric iron ions distributed in the space between layers of the silica (polyhedron I). The initial iron-containing complex with the structure of polyhedron I is not active in synthesis from CO and H_2 ; increasing activity in synthesis is related to the formation of reduced labile iron (II) complex contained in the matrix and microcrystallites of non-stoichiometric magnetite on the surface of the silica. Figures 2; references 12: 7 Russian, 5 Western.

6508/5915
CSO: 1841/190

CRYSTALLINE AND MOLECULAR STRUCTURE OF THE BIMETALLIC COMPLEX



Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 12, Dec 86 (manuscript received 3 Apr 86) pp 2819-2821

[Article by T. M. Arkhireyeva, V. K. Bel'skiy, B. M. Bulychev and G. L. Soloveychik, Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka; Moscow State University imeni M. B. Lomonosov; Physical Chemistry Institute imeni L. Ya. Karpov]

[Abstract] A study was made of the structure of the stable adduct Cp_2TaH_3 with a strong Lewis acid ($ZnCl_2$), the stoichiometry of which-- $Cp_2TaH_3 \cdot ZnCl_2 \cdot THF(I)$ --suggests the presence of hydride bridge atoms in the structure. IR and PM are spectral data and x-ray structural analysis indicates that Cp_2TaH_3 forms with $ZnCl_2$ in THF, a stable complex of the composition $Cp_2TaH_3 \cdot ZnCl_2 \cdot THF$,

bonded in the solution through a single hydrogen bridge Ta-H-Zn, in the crystal through a dual bridge $\begin{array}{c} \text{H} \\ \diagup \quad \diagdown \\ \text{Ta} \quad \text{Zn} \\ \diagdown \quad \diagup \\ \text{H} \end{array}$. According to x-ray structural analysis,

the polyhedron at the Zn atom in $\text{Cp}_2\text{TaH}_3 \cdot \text{ZnCl}_2 \cdot \text{THF}$ is a strongly distorted trigonal bipyramid, while the polyhedron at the Ta atom is irregular. Figure 1; references 8: 1 Russian, 7 Western.

6508/5915
CSO: 1841/190

UDC 541.183:546.28(088.8)

SYNTHESIS OF METALLIC STRUCTURES ON SOLID SUBSTRATES WITH HYDRIDE- AND HYDROXIDE-FUNCTIONAL GROUPS THROUGH STAGE OF CHEMOSORPTION OF CHLORIDES

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: SERIYA R: FIZIKA, KHIMIYA in Russian No 3, Aug 86 (manuscript received 20 Jun 85) pp 78-84

[Article by A. G. Syrkov]

[Abstract] A study is reported of the regularities of formation of highly dispersed stable metallic iron in a surface layer on solid oxide substrates. Substrates used were silica gel and hydropolysiloxane. Silica gel was metallized by reduction in hydrogen of a layer of metallochloride groups formed by chemisorption of iron chloride on the hydroxylated surface. The major condition for reproducible production of solids is removal from the equilibrium state as they are synthesized. This approach to metallization of a surface, with continuous feeding of reagents, removal of their excess and the reaction products in a gas medium, is superior to the method based on fixation of organometallic complexes. Figures 4; references 22: 20 Russian, 2 Western.

6508/5915
CSO: 1841/166

UDC 541.67

CONFORMATIONS OF 2-BROMO-1,3,2-DIOXAPHOSPHOLANE AND TETRABROMOMETHANEDIPHOSPHINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 12, Dec 86
(manuscript received 16 Oct 85) pp 2694-2695

[Article by I. I. Patsanovskiy, E. A. Ishmayeva, A. S. Sherman, A. N. Kurkin, Z. S. Navikova and N. B. Karlstet, Kazan State University imeni V. I. Uluhanov-Lenin]

[Abstract] Continuing studies of conformations of organophosphorus compounds with the P-Br bond, dipole moments and the Kerr effect were used to study 2-bromo-1,3,2-dioxaphosphorinane (I), 2-bromo-1,3,2-dioxaphospholane (II) and tetrabromomethanediphosphine (III). Conformations were identified by the method of dipole moments and the Kerr effect. Dipole moments were calculated using the parameters of polarity and polarizability of the P-Br bond. Experimental dipole moments and mK were determined in CCl_4 at 25°C in an atmosphere of dry argon. 2-Bromo-1,3,2-dioxaphospholane was found to have envelope conformation in solution with axial orientation of the P-Br bond. Conformation equilibrium of two checkerboard forms was observed for tetrabromomethanediphosphine in solution. Figure 1; references 8 (Russian).

6508/5915
CSO: 1841/187

UDC 547.241

PRODUCTION OF OXIDES OF CHLOROMETHYL- AND METHOXYCHLOROMETHYL DIORGANOPHOSPHINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 12, Dec 86
(manuscript received 28 Dec 85) pp 2705-2707

[Article by V. A. Chauzov, Yu. N. Studnev, S. V. Agafonov and A. V. Fokin]

[Abstract] Chloroalkyldiorganophosphinioxides are key initial compounds in the synthesis of various functionally substituted, practically-promising phosphinioxides. During synthesis of chloromethyldioctylphosphinoxide, it was found that the known general method, interaction of diorganochlorophosphine and polyformaldehyde, in this case leads to a complex mixture containing only traces of the desired end product. The only acceptable method for production of the phosphinoxide is successive oxymethylation of dioctylphosphinous acid

with polyformaldehyde followed by chlorination of the oxymethylphosphin oxide produced with phosphorus pentachloride. A method is developed for synthesis of chloromethyl- and methoxychloromethyldiphenylphosphin oxides by alkylation of an aluminum chloride complex of diphenylchlorophosphine and hydrochloride with polyformaldehyde in the presence of phosphorus oxychloride and dichloromethylmethyl ether in the presence of diethyl ether. Chloromethyldioctylphosphin oxide is obtained from dioctylphosphinous acid in two stages--by oxymethylation followed by substitution of the oxygroup in oxymethylphosphin oxide by treatment with phosphorus pentachloride. References 3 (Russian).

6508/5915
CSO: 1841/187

UDC 542.91:547.1'118

PENTAERYTHRITE PHOSPHITE-PHOSPHONATE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 12, Dec 86
(manuscript received 14 Jan 86) pp 2795-2797

[Article by R. N. Gubaydullin and E. T. Mukmenev, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Affiliate, USSR Academy of Sciences]

[Abstract] Pentaerythrite phosphite-phosphonate was synthesized using O-((2,6,7-trioxa-1-phosphabicyclo[2.2.2] octyl-4)-methyl)O, O-diethylphosphite, containing bicyclic phosphite and acyclic phosphite fragments in which the phosphorus atoms differ in their nucleophilicity. Distillation of the products of the interaction yielded two isomer compounds: O-((2,6,7-trioxa-1-phosphabicyclo[2.2.2] octyl-4) methyl)-O-ethyl-P-ethylphosphonate, a colorless oil with boiling point 165-167°C at 0.1 mmHg and 3,9-diethyl-3,9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphapyro[5.5] undecane $C_9H_{18}O_6$, colorless crystals with melting point 180-181°C from absolute dioxane, boiling point 218-220°C, 0.03 mmHg. References 5: 2 Russian, 3 Western.

6508/5915
CSO: 1841/187

UDC 547.491.8.04

SYNTHESIS OF TRICHLOROACETONITRILE

Baku AZERBAYDZHANSKIY KHMICHESKIY ZHURNAL in Russian No 3, May-Jun 86
pp 39-44

[Article by G. R. Aliyev, V. I. Kalarev, R. A. Karakhanov, E. M. Movsumzade, Ye. A. Lisitsyn and V. A. Vinokurov, Azerbaijan Institute of Petroleum and Chemistry imeni M. Azizbekov; Moscow Institute of Oil and Gas imeni Academician I. M. Gubkin]

[Abstract] Study was made of various methods of synthesis of trichloroacetonitrile, an important organic-synthesis intermediate. Methods modified by the authors for production of intermediate products as well as trichloroacetonitrile are discussed, allowing analysis of the course of the reactions involved. The product was produced by heating equimolar quantities of trichloroacetic acid and thionyl chloride in the presence of 10% DMPA, 2-3 hours. Methyltrichloroacetate was produced with a yield of 83-85% by direct esterification of the acid, heated with a 5-fold excess of methanol for several hours. The amide was converted to trichloroacetonitrile by removal of H_2O by phosphorus pentoxide at 165-180°C. References 4 (Russian).

6508/5915
CSO: 1841/338

UDC 66.095.11

N-OCTYLACETAMIDE AS ANTIFUNGAL PREPARATION

Baku AZERBAYDZHANSKIY KHMICHESKIY ZHURNAL in Russian No 3, May-Jun 86
pp 126-128

[Article by L. I. Akhmedova, S. S. Avanesova, D. Z. Samedova, K. Ya. Aliyeva, S. A. Aliyeva and Z. A. Ekhtibarova]

[Abstract] The purpose of this work was expansion of the assortment of antimicrobial preparations with expanded antimicrobial properties. Acetonitrile was condensed with diisobutylene in the presence of acid catalysts to synthesize N-octylacetamide. The influence of variable parameters on the yield of the end product was studied. The antimicrobial properties of the compound were studied in comparison to compounds presently used for the purpose, revealing its superiority against *Candida* and *Aspergillus niger*, allowing it to be recommended as an antifungal preparation for local application. Reference 1 (Russian).

6508/5915
CSO: 1841/338

SOME ASPECTS OF ORGANIZATION OF STATE TESTING OF EXPERIMENTAL MODELS OF
PETROLEUM PRODUCTS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 3, Mar 87 pp 2-4

[Article by Yu. G. Kapralchenko, V. I. Tyazhelnikov and S. V. Menshikov]

[Abstract] The system by which state testing of experimental models of petroleum products is organized is described, including state proposals for organization of testing of experimental products, discussion of the proposals, receipt of comments from interested organizations suggesting changes to the proposed tests and the decision by the State Commission. In 1987, as many as 50% of the suggestions originally made were not included in the final testing plan, due in part to the desire of workers to speed up the introduction of the results of research. Haste in producing requests and samples of materials results in incomplete presentation and filling out of forms, achieving the opposite of the result intended. This article describes the proper methods for proceeding through the testing process to assure that new materials will be tested as expeditiously as possible.

6508/5915

CSO: 1841/315

UDC 621.892.211

COMPETING FACTORS IN AGING OF OIL IN PISTON AND GAS TURBINE ENGINES

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 3, Mar 87 pp 21-24

[Article by S. V. Ventsel (deceased), V. A. Bazderkin and V. N. Mamayev]

[Abstract] Tests have shown that increasing the oil change interval to once per season actually decreases the wear rate of internal combustion engine parts. Results are presented from tests of oils on a friction machine, indicating that in all cases there was less wear when the oils were used for longer periods of time. Tests with bearings showed a greater radial gap following testing using fresh oil than in bearings tested using "spent" oil. The use of older oil generally decreased the level of vibration and roughness of rolling tracks, while increasing the hardness of bearing elements, thus confirming the superiority of older oil. The desirability of using older oil is determined

by the relationship of competing factors in the process of aging of the oil: spontaneous improvement of anti-wear properties, thermal stability and other characteristics and the aging of additives, resulting in deterioration of usage characteristics. Oil typically shows a brief period of evolution of its properties followed by a long period of stabilization. Oil need be changed only if the additives are insufficiently stable, or if normal operating conditions have been exceeded, causing deterioration of the oil. Figure 1; references 24: 23 Russian, 1 Western.

6508/5915
CSO: 1841/315

UDC 532.783:548-14

INFLUENCE OF L-MENTHONE DERIVATIVES ON PROPERTIES OF SMECTIC C-PHASE OF A LIQUID CRYSTAL

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 3, Mar 87
(manuscript received 10 Apr 85) pp 693-696

[Article by D. F. Aliyev, G. M. Bayramov and V. G. Tishchenko, Azerbaijan State University, Baku]

[Abstract] Ferroelectric liquid crystals are considered promising for the creation of optoelectronic modules with good speed and low control voltages. A mixture of a C smectic and an optically active additive can be used to produce such substances. Optically-active additives are needed which induce spontaneous polarization and have significant optical rotation force. This article demonstrates that 2-arylidene derivatives of L-menthone can be used for this purpose. The derivatives are shown to be capable of inducing spontaneous polarization. Recent studies have shown that the dipole moment related to the chiral fragment is responsible for the development of spontaneous polarization. The authors believe that in addition to this factor, the method of packing of the molecules of the optically-active additive in the matrix is also important. Figures 3; references 6: 4 Russian, 2 Western.

6508/5915
CSO: 1841/290

INFLUENCE OF ORGANIC ADDITIVES ON PROTECTIVE PROPERTIES OF PAINT AND VARNISH COATINGS

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 87
(manuscript received 27 Oct 86) pp 37-39

[Article by B. T. Turayev, F. K. Kurbanov and A. Ikramov, Dzhizak Affiliate of the Tashkent Polytechnic Institute]

[Abstract] The electrode potential beneath an enamel film was used to estimate the influence of inhibitors on the protective properties of the type KhS-759 enamel. Aqueous solutions of $\text{SO}_2 + \text{HF}$, pH 1.18 and $\text{HF} + \text{H}_2\text{SO}_4$, pH 1.76 were used. The additives used were organic compounds (aniline, captax, propargyl alcohol), 1.0 mass percent. Aniline, captax and propargyl alcohol improved the protective properties of the coatings by a factor of 1.4-1.6, and are recommended as corrosion inhibitors for paint and varnish materials. Sulfur and adsorbed hydroxyl ions increase corrosion. References 4 (Russian).

6508/5915
CSO: 1841/339

UDC 532.783-539.2

STUDY OF NEMATO-CHIRAL MIXTURES WITH OPTICALLY ACTIVE SALICYLIDENANILES

Tbilisi IZVESTIYA AKADEMII NAUK GRUZINSKOY SSR: SERIYA KHIMICHESKAYA
in Russian Vol 11, No 3, Jul-Sep 85 (manuscript received 7 Feb 84) pp 186-190

[Article by K. D. Binokur, M. A. Gogadze, K. G. Dzhaparidze, G. S. Chilaya and Z. M. Elashbili, Institute of Cybernetics, Georgian Academy of Sciences]

[Abstract] Cholesteric systems with induced spiral structure are promising as practical liquid crystal systems, retaining many of the advantages of nematic liquid crystals and having selective optical properties due to the twisted supermolecular structure, making them suitable for various types of electro-optical and thermooptical devices. In order to expand the class of electrically optical devices, the authors synthesized a number of alkoxysalicylidenaniles based on 1-menthol. Various classes of liquid crystal compounds were selected as the nematic matrices. The temperature dependence of the step of the supermolecular structure was studied in all of the chiral systems. It was found that the force of induction of the spiral in azoxy compounds was higher than in axomethine by an average of 25%. Temperature sensitivity was found to correlate with the temperature of isotropic transition of the mixtures. This was not observed when 1-menthol alkoxybenzoates were used as the optically active additives, apparently due to the quasi-six-membered ring with intramolecular hydrogen bond and the possibility of formation of other intermolecular associates. Figures 4; references 7: 5 Russian, 2 Western.

6508/5915
CSO: 1841/342

UDC 678.4.065:629.114.2

INCREASING QUALITY OF AGRICULTURAL TIRES DURING TWELFTH FIVE-YEAR PLAN

Moscow KAUCHUK I REZINA in Russian No 1, Jan 87 pp 6-7

[Article by V. N. Laptev and V. N. Belkovskiy]

[Abstract] During the present 5 Year-Plan, the introduction of new tire design, improvement of existing designs and removal of obsolete models from production will result in renewal of more than half the agricultural tires in service. The use of materials with improved physical and mechanical properties such as tires with polyamide cord will also improve tire performance. Tire designers must meet conflicting demands for improved tire life and reduced tire pressure on the fields. Further trends include: expansion of the use of radial tires; expansion of the assortment of wide-tread tires with lower pressure; and creation of groups of tires better matched to equipment operating conditions, such as low profile, low tread mass tires and noninflated tires for equipment used seasonally. References 4 (Russian).

6508/5915

CSO: 1841/337

UDC 678.7.01:678.4.06

PROPERTIES OF SKN-18PVKh-30 RAW RUBBER AND RUBBER MANUFACTURED FROM IT

Moscow KAUCHUK I REZINA in Russian No 1, Jan 87 pp 10-12

[Article by G. A. Lysova, G. A. Sorokin, E. V. Sineva and M. F. Gerasimova]

[Abstract] Chloroprene rubber has superior resistance to heat, ozone and the atmosphere, flame, petroleum products and many corrosive substances. Butadiene-nitrile rubber is superior to polychloroprene in resistance to heat, oil and gasoline, but inferior in resistance to flame and ozone. SKN-18PVKh-30 butadiene-nitrile rubber containing polyvinyl chloride was tested, and it was found that the PVC increased the ozone resistance of the rubber, as well as the stress for fixed elongation, tearing resistance, hardness, resistance to swelling in isooctane-plus-toluene, but reduced tensile strength, relative elongation, elasticity and resistance to cold. Thermal aging at 125°C improved tensile strength. At elevated temperatures, vulcanisates containing PVC became

brittle quickly. The combination of good ozone-and-oil resistance of SKN-18PVKh-30 with satisfactory strength properties indicates this rubber is promising for replacement of polychloroprene. Figure 1; references 6: 5 Russian, 1 Western.

6508/5915
CSO: 1841/337

UDC 678.029.42

SPECIFICS OF FORMATION OF ADHESION BONDS UPON ATTACHMENT OF RUBBER TO METALS BY ISOCYANATES

Moscow KAUCHUK I REZINA in Russian No 1, Jan 87 pp 14-17

[Article by N. P. Tikhonova, L. V. Ginzburg and A. A. Dontsov]

[Abstract] A study is presented of the significance of diffusion processes in the formation of joints between rubber and metal with isocyanate adhesives during vulcanization. Studies were performed on butadiene-nitrile rubber, nonpolar ethylene-propylene and low-polarity isoprene rubber, preliminarily extracted with boiling ethanol to remove antioxidants and emulsifiers. High bond-strength of the isocyanate adhesive was produced by diffusion processes in the contact zone and subsequent polymerization in the substrate, forming a system consisting of the polymerized adhesive and vulcanized substrate. It is the process of diffusion of isocyanates in the adhesion contact zone which explains the influence of one substrate on the adhesion of isocyanates to another. In this case, the adhesive diffuses into the elastomer, which then contacts the surface of the metal. Leading to a decrease in strength and durability of the adhesive joint. Figures 3; references 15 (Russian).

6508/5915
CSO: 1841/337

UDC 678.84.26:546.987.01

SILOXANE ELASTOMERS IN MEDICINE

Moscow KAUCHUK I REZINA in Russian No 1, Jan 87 pp 29-33

[Article by A. V. Gorshkov and L. Z. Khazen]

[Abstract] Siloxane elastomers are widely used in medicine due to their physiological inertness, hydrophobicity, good hemocompatibility and tissue compatibility. It is generally recognized that siloxane endoprostheses are practically not subject to biological destruction and cause no negative reaction of the body, including allergic and carcinogenic reactions. Siloxane elastomers to be used for endoprostheses should contain no low-molecular-weight products. Vulcanization of siloxane elastomers with silicohydrides is preferred. Uses of siloxane implantates are discussed in general terms. References 74: 21 Russian, 53 Western.

6508/5915
CSO: 1841/337

METHOD OF DETERMINING INDIVIDUAL MATERIAL CONSUMPTION NORMS IN PRODUCTION OF LATEX PRODUCTS

Moscow KAUCHUK I REZINA in Russian No 1, Jan 87 pp 40-42

[Article by A. I. Rybak, L. M. Zadnepryantseva and I. A. Elkina]

[Abstract] The approach for development of standards for consumption of materials in the manufacture of latex products is discussed. Each process in the production of the products may consume materials actually utilized in the end product, produce wastes and involve losses resulting from the manufacturing technology. The standards for waste and losses of latex and its ingredients are developed on the basis of an experimental calculation method which is based on balance measurements made directly in production or obtained in experimental installations and subsequently adjusted for industrial conditions. Examples of these calculations are presented. The method has been used to calculate and experimentally check industry loss standards which can allow enterprises in "Soyuzrezinoobuv" All-Union Production Association to reduce consumption of latex by 110 tons per year.

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UDC 678.84.063.01:541.6::678.048

THERMAL STABILIZATION OF FERRITE-FILLED SILOXANE RUBBERS

Moscow KAUCHUK I REZINA in Russian No 1, Jan 87 pp 42-43

[Article by A. G. Alekseyev, T. I. Pastor, Ye. M. Mikhlin and M. R. Shikalina]

[Article] New composite materials have been developed based on siloxane raw rubber and magnetic, particularly ferrite, fillers. The present work studied the influence of copper-containing, nickel-zinc and cobalt ferrite fillers on thermal oxidative destruction of magnetic rubbers of this type. Thermal destruction was studied in a medium of nitrogen, thermal oxidative destruction in air. Introduction of thermal stabilizers shifted the first exothermic peak toward higher temperatures, but in ferrite-filled rubbers redoxide had no significant thermal stabilizing effect. This is explained by the inhibition of high-temperature reactions of thermal oxidation by the oxides of metals contained in the ferrite fillers. Copper-containing ferrite powder was most effective. References 7 (Russian).

6508/5915

CSO: 1841/337

RADIATION-CHEMICAL STRUCTURING OF POWDERED COMPOSITIONS

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 87 pp 14-15

[Article by V. S. Ivanov, N. A. Kalinina, V. K. Smirnova, B. G. Zadontsev, A. S. Burmenko, N. I. Gorbunov, G. A. Yefremov and N. M. Knyazeva]

[Abstract] The use of powdered materials is hindered by the need for high temperature curing. Ionizing radiation can cure powder compositions at room temperature or even lower. This article studies the possibility of radiation-chemical structuring of powdered epoxy-diane oligomers modified with unsaturated acids. The oligomer EAS-8A was found to be structured by accelerated electrons, the yield of the gel fraction with 50 kGr absorbed dose being 30%, with 400 kGr--85%. Further increases in dose had little influence on gel fraction yield, increasing it to only 90%. With EKS-20, the process was slower, 400 kGr yielding 50% gel fraction. The data indicate the promise of using EAS-8A with maleic acid imides as the basis for powdered radiation cured materials. Figure 1; references 10: 4 Russian, 6 Western.

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CSO: 1841/324

THERMAL STABILITY OF RADIATION-MODIFIED BLOCK COPOLYMER OF BUTADIENE WITH α -METHYLSTYRENE

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 87 pp 28-30

[Article by A. T. Govorkov, D. L. Muryshkin and Yu. N. Safonov]

[Abstract] When a block copolymer of butadiene with α -methylstyrene is treated at elevated temperature, thermal oxidation processes occur, changing the structure of the polymer and causing deterioration of its physical properties. This work has studied the kinetics of thermal oxidation processes in the copolymer and the possibility of modifying the properties of the copolymer by means of ionizing radiation. When the block copolymer, known by the Soviet type-name DMSTR, was bombarded with accelerated electrons, two competing processes occurred: cross-linking of butadiene blocks and destruction of α -methylstyrene blocks. Maximum thermal stability was provided at an absorbed radiation dose of $2.5-3.5 \cdot 10^5$ Gr. Figures 3; references 5 (Russian).

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INCREASING HARDNESS UPON IMPRESSION OF ELASTIC SHAPED POLYURETHANE FOAM

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 87 pp 32-33

[Article by V. A. Novak, O. Yu. Krasnova and R. A. Gommen]

[Abstract] Mineral or polymer fillers are used to increase the impression hardness of elastic polyurethane foam. This work studied the influence of the nature of the polymer filler on technological parameters of production and mechanical properties of elastic polyurethane foams. Regardless of the nature of the dispersed phase used and method of its production, polymer dispersions always increased the hardness of the plastic foam, decreasing formation time and temperature and decreasing the time required to reach the maximum foam hardness, as well as rebound elasticity. The use of polymer dispersions thus improves the technological parameters of polyurethane foam. The type of dispersion can be selected on the basis of cost and technological properties, storage stability and toxicity. References 6 (Western).

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COMPUTER DATA BASE ON RADIATION RESISTANCE OF PLASTICS

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 87 pp 42-43

[Article by V. S. VALYAVKIN, M. P. Platonov, T. A. Speranskaya and N. N. Shevyakova]

[Abstract] An attempt was made to create a data base, on radiation resistance of plastics, within the "Polimer" automated information-retrieval system, on the properties and applications of polymer materials. The data base contains a table of properties of specific materials and a table of properties of major groups of materials, including data on the properties of 9000 types of polymers. The capabilities of the system were expanded by introducing a new concept, the "generalized group," dividing the assortment of polymer materials in the data base into 130 basic generalized groups. This allows the system to be used to evaluate materials based on their radiation resistance. References 7 (Russian).

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CSO: 1841/324

APPLICATION OF LOW DENSITY COATINGS BY GAS-FLAME ATOMIZATION METHOD

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 87 pp 59-60

[Article by A. I. Aksenov and K. V. Vasilyev]

[Abstract] The method of gas-flame atomization, in which a powdered polymer composition is passed through a burner flame, after which the melted polymer particles, striking a heated substrate, form a coating on it, can be used to apply coatings of spheroplastics, which have a number of valuable physical-mechanical and heat-physical properties. In order to improve the bulk properties of compositions containing 10-20% microspheres, a small quantity of aerosil and molybdenum disulfide was introduced before application of coatings to metal and plastic substrates. This improved the adhesion strength of the bond between the coating and the substrate. The coatings produced had low heat conductivity (0.06-0.1 W/m·K), allowing them to be used as thermal insulation.

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SYNTHESIS AND STUDY OF MONOMER AND POLYMER RARE-EARTH ELEMENT CHELATES

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian No 9, Sep 86
pp 32-36

[Article by P. R. Yeszhanova, B. A. Zhubanov and Ye. V. Gutsalyuk]

[Abstract] This article describes for the first time a multistage method of producing soluble monomer and polymer chelates based on tetraacetyethane (TAE) and the salts of rare-earth elements, and the study of the properties and compositions of the polymers produced. In stage one, 1,1,2,2-TAE was interacted with rare-earth element salts at a ratio of 2:1 to synthesize monochelates. A sodium hydroxide solution was added to the reaction to increase the yield of the monochelate. In stage two, the monochelates formed were used to synthesize soluble polychelates, the reaction conducted in acetyl acetone with a monochelate: erbium:chloride ratio of 2:1. The polychelate produced had a molecular weight of 1500 atomic units and was soluble in m-cresol, partially in dimethylsulfoxide and dimethylformamide. An alcohol solution of the rare-earth element salt was added to the solution in m-cresol to increase MW to 3000 units. Compositions were confirmed by IR spectroscopy. Figures 3; references 10: 9 Russian, 1 Western.

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CSO: 1841/167

UDC 541.20

LOW TEMPERATURE RADIATION-CHEMICAL SELF-OSCILLATION RESULTING FROM
OCCURRENCE OF EXOTHERMIC NONBRANCHING CHAIN REACTION IN SOLID

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 3, Mar 87
(manuscript received 9 Jul 85) pp 688-692

[Article by V. A. Polyehktov]

[Abstract] A previous article reported self-oscillation of the reaction rate of radiation-chemical hydrobromination in a polycrystalline complex of $C_2H_4 \cdot HBr$.

This article develops a theory of the low temperature self-oscillation initiated by γ -quanta during this reaction. It is proven that the thermokinetic system can be in a self-oscillating state. Equations are derived describing the state, which is shown to have a stable limiting cycle. The nature of the oscillation is demonstrated to be thermokinetic. References 9 (Russian).

6508/5915
CSO: 1841/290

UDC 541.15

INFLUENCE OF 2,6-DI-TERT-BUTYL-4-METHYLPHENOL ON YIELD OF PRODUCTS OF
RADIOLYSIS OF ALKANES

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 2, KHIMIYA in Russian Vol 28, No 1, Jan-Feb 87 (manuscript received 6 Sep 85) pp 66-70

[Article by Ye. A. Antonova, T. F. Trashilova and V. V. Carayeva,
Department of Electrochemistry]

[Abstract] In response to the need to study the radiation stability of organic compounds and their mixtures, model systems were used to study the influence of ionol on the radiation-chemical yields of products of the radiolysis of alkanes. Model hydrocarbons selected were cyclohexane and isooctane, typical representatives of cyclical and branched alkanes whose radiation products can be reliably identified. Evacuated solutions of ionol in cyclohexane and isooctane were irradiated with ^{60}Co γ -rays at 28°C,

$4-4.5 \cdot 10^{16}$ eV/ml·s. The radiation products were analyzed by gas-liquid

chromatography. Ionol was found to inhibit the formation of end products arising in radical-molecule reactions and by reactions of recombination and disproportionation of alkyl radicals beginning to an ionol concentration of about 10^{-3} M. During radiolysis of isooctane, a significant change in the yield of hydrogen and methane began at an ionol concentration of about 10^{-1} M, while the yield of isobutane, isobutylene and diisooctyls was influenced beginning at about 10^{-2} M. The yields of products of radiolysis of isooctane are constant at > 0.25 M ionol. Figures 3; references 10: 7 Russian, 3 Western.

6508/5915
CSO: 1841/308

UDC 533.932

EFFECTS OF ANISOTROPY OF GAS STREAM ON CO_2 DISSOCIATION IN MODERATE PRESSURE CONTRACTED UHF DISCHARGE

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 21, No 2, Mar-Apr 87
(manuscript received 30 Sep 85) pp 173-177

[Article by A. M. Zharnov]

[Abstract] Determinations were made of the degree of conversion of CO_2 in contracted UHF discharge at 5-20 kPa, with the working gas fed at a changing angle ($15-60^\circ$) and a gas rate of $2-10 \text{ dm}^3/\text{sec}$ under 7-25 kW. The mechanisms of CO_2 dissociation at the given flow rates and angles were affected by both gas dynamics and the geometric parameters of the reactor. At a feed rate below $2 \text{ dm}^3/\text{sec}$ highly efficient decomposition is possible under nonequilibrium conditions at the periphery of the discharge. An increase in the feed rate of the plasma-forming gas leads to predominance of thermal dissociation due an increase in the initial temperature at the border of the discharge. An increase in the efficiency of plasmochemical dissociation of CO_2 under nonequilibrium conditions requires intense, small-scale turbulence to prevent high temperatures. Figures 2; references 5 (Russian).

12172/5915
CSO: 1841/328

LASER-INDUCED PHOTOCHEMICAL REACTIONS OF NO₂

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 21, No 2, Mar-Apr 87
(manuscript received 29 Mar 85) pp 183-188

[Article by V. P. Balakhnin, S. M. Kostikov, O. M. Sarkisov and S. G. Cheskis,
Institute of Chemical Physics, USSR Academy of Sciences]

[Abstract] A study was conducted on the quantum yields of laser-initiated reactions of NO₂^{*} with NO₂, CO, and C₂F₄. The resultant data revealed relatively low yields, depending on the wavelength in the 541.5-457.9 nm range and greater with an increase in the energy of the light quanta. The reactions were little affected by the temperatures employed (273-343 K), as indicated by the low energies of activation (6.25-6.68 kJ/mole). The yields were also refractory to magnetic field effects, indicating that the primary factor influencing the outcome of the reaction is the state of electronic excitability. Figures 2; references 7: 3 Russian, 4 Western.

12172/5915
CSO: 1841/328

TRIPLET CORRELATION EFFECTS IN SUPERCRITICAL WATER

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 1, Jan 87
(manuscript received 22 Jan 86) pp 247-250

[Article by Yu. V. Lisichkin, A. G. Novikov and N. K. Fomichev]

[Abstract] Experimental data for slow-neutron scattering by supercritical water provided the basis for isothermic derivatives and calculation of a model of the triplet functions. Proceeding from pair distribution functions, a qualitative description was obtained a space-time correlation functions. The effects of triplet correlations on the shape of the autocorrelation function are presented graphically for supercritical water. Figures 2; references 7: 2 Russian, 5 Western.

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CSO: 1841/320

ANALYSIS OF TRANSLATIONAL SEGMENT OF SLOW-NEUTRON SCATTERING BY
SUPERCRITICAL WATER

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 1, Jan 87
(manuscript received 22 Jan 86) pp 250-253

[Article by Yu. V. Lisichkin, A. G. Novikov and N. K. Fomichev]

[Abstract] Experimental data were analyzed for slow-neutron scattering by supercritical (400 °C) water for the isolation of the translational segment of scattering, using a previously described biphasic model [Lisichkin, Yu. V., et. al., ZHURN. FIZ. KHIMII, 59(7): 1671, 1985]. This approach made it possible to secure additional information on the microscopic heterogeneity of the supercritical state of water. The data on the liquid- and gas-like states of supercritical water obtained by the slow-neutron scattering method were shown to be in good agreement with the information derived from IR spectra. Figures 3; references 9: 8 Russian, 1 Western.

12172/5915
CSO: 1841/320

UDC 630*284.002.34:54-44

METHODS OF PHYSICAL ACTIVATION OF AQUEOUS SOLUTIONS OF SUBSTANCES STIMULATING FORMATION AND LIBERATION OF RESINS

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 2,
Feb-Mar 87 pp 21-22

[Article by V. M. Mashkov, Urals Institute of Wood Technology]

[Abstract] Although the structure of water is not fully known and there are difficulties in the theoretical demonstration of increased biological activity of water and aqueous solutions, the time has come to analyze the positive effects achieved by the use of activated water. This article presents a suggested mechanism for the effect of physical methods on water and aqueous solutions of stimulants. Methods include application of ultrasound, magnetic fields, introduction of silver ions, electrochemical activation of aqueous solutions and the effect of degased water. The activation of water and of aqueous solutions of stimulators by these physical methods does not influence the quality of the resin produced, does not suppress the vital activity of the trees tapped, and is harmless for man and other homoiotherms. The wide use of stimulants treated by such methods can increase the production of resin. Resin production increases of 4.7 to 45.2% are reported. References 12 (Russian).

6508/5915

CSO: 1841/316

UDC 630*86.002.6:658.562

STANDARDS FOR NUMBERS OF PERSONNEL INVOLVED IN WOOD-CHEMICAL PRODUCT QUALITY CONTROL

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 2,
Feb-Mar 87 pp 24-25

[Article by L. V. Nikolayeva, Senior Scientific Associate, Central Scientific Research Institute of Wood Chemistry]

[Abstract] Standards have been developed for numbers of personnel involved in quality assurance in wood chemistry production on the basis of technologic regulations for the production of wood chemical products, applicable technical

standard documents for production and consumption of raw materials, standard methods for determining the time required to perform analyses or tests, logs of enterprises performing quality control and photographic time and motion studies of quality assurance workers. The equations used to derive the standards are presented, and the numbers of workers called for by the standards are listed in tables. References 6 (Russian).

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UDC 541.24.088.8

DIMENSIONALITY AND ORDERING OF SET OF COMPLEX CHEMICAL COMPOUNDS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 1, Jan 87
(manuscript received 24 Feb 86) pp 118-121

[Article by Academician V. V. Kafarov, I. N. Dorokhov, V. N. Vetokhin and
L. P. Volkov, Moscow Chemical Engineering Institute imeni D. I. Mendeleev;
Kuybyshev Polytechnic Institute imeni V. V. Kuybyshev]

[Abstract] The set of all complex chemical compounds is an extremely large but finite, denumerable set of subsets, based on the set of all chemical elements. A basic troika of characteristics is suggested as a starting point for ordering the set of complex chemical compounds: A--the sum of the atomic numbers of the elements included in a molecule of a compound, M--the molecular weight of the compound, and P--the density of the compound. Placement of all known compounds in two sequences based on this troika, for organic and inorganic compounds, reveals a functional interdependence among compounds with similar values of the three characteristics, and also among sets of chemical compounds. As mw, density and the sum of atomic numbers increase, the basic physical-chemical properties and constants change in an ordered fashion, increasing or decreasing. This rule allows all complex chemical compounds to be subdivided into modules, ordered subsets of substances with similar such properties, revealing a previously unknown system for ordering of these modules of complex chemical compounds. The value of this new rule lies in its application to expedient, automated search for new substances, materials, catalysis and composites with previously assigned properties, allowing automated prediction of the properties of substances, including mw, density, temperature, melting and boiling point, heat of evaporation and heat capacity with an accuracy an order of magnitude greater than other known experimental analysis methods.
References 4 (Russian).

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CATION-RADICAL SALTS OF TETRACHALCAFULVALENES WITH HYDROFLUORIDE ANION

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 12, Dec 86 (manuscript received 29 May 85) pp 2760-2765

[Article by L. M. Goldenberg, R. N. Lyubovskaya, O. S. Poshuikina, Ye. V. Stolina and M. L. Khidekel, Department of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka]

[Abstract] An attempt was made to synthesize a number of onium hydrofluorides $R_4EF(HF)_n$ by the method of interacting chlorides with excess HF, but only when Ph_4PCl was used, was the solid product $Ph_4PH_2F_3$ gained. Where $R=Bu$, $E=N$, a viscous liquid was produced. Neutralization of the aqueous solution of tetrabutylammonium hydroxide with an excess of hydrofluoric acid and subsequent removal of the excess HF and water by drying in a vacuum formed a colorless solid nonhydroscopic substance with melting point over $100^\circ C$, $Bu_4NF(HF)_n$.

After dissolution in dry acetone and precipitation with absolute ether, a colorless crystalline substance was produced, melting at $115-185^\circ C$ depending on the method of production. The hydrofluorides obtained were used as electrolytes for the production of conductive cation-radical salts of tetrachalcafulvalenes. The salts had conductivity of $150-200 \text{ ohm}\cdot\text{cm}^{-1}$ to $10^{-3} \text{ ohm}\cdot\text{cm}^{-1}$. References 15: 6 Russian, 9 Western.

6508/5915
CSO: 1841/190

UNIVERSITIES AND RESEARCH ACHIEVEMENTS

Moscow KHIMIYA I ZHIZN in Russian No 12, Dec 86 pp 28-31

[Article by L. Strelnikova]

[Abstract] The USSR Ministry of Higher Education presented an exhibit entitled "University Science for the Nation" in June of 1986, presenting the practical results of university scientific research. This article briefly describes some of the studies featured in the exhibit, including the development of antistress substances for plants, protecting them from such stress factors as drought and frost; the creation of siloxane rubber or "silaplene," a vulcanized organo-silicon compound suitable for use in the manufacture of artificial heart valves; the design of a simple method of manufacturing reinforced plastics based on thermoplastic polymers without the use of corrosive or poisonous volatile solvents; development of a technology for production of a new polyester thermo-elastoplast called "benzelast" for the manufacture of pipes, hoses, etc. capable of withstanding frost, not swelling or dissolving in gasoline or oil, usable at temperatures from -60 to $+150^\circ C$; and the development of a technology for manufacturing thermally stable polyethylene tapes containing additives which make them elastic, thermally stable, frost proof, insensitive to light, and with good adhesive properties.

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